Fujitsu

ScanPartner 600C

OEM Manual

Version 1.0

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Fujitsu Inc.

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1. General

1.1 General

Scan Partner 600C image scanners produce excellent electronic images from documents using the high quality optical image scanning technology and output to the host system via SCSI interface.

On the standard flat-bed, the Scan Partner 600C can scan a single loose page or a single page of a bound book. The standard flat-bed can accommodate a letter size/A4 page. The Scan Partner has an automatic document feeder (ADF) that can accommodate up to 50 pages.

The Scan Partner outputs data on the Small Computer System Interface (SCSI). Figure 1.1 is the functional block diagram.

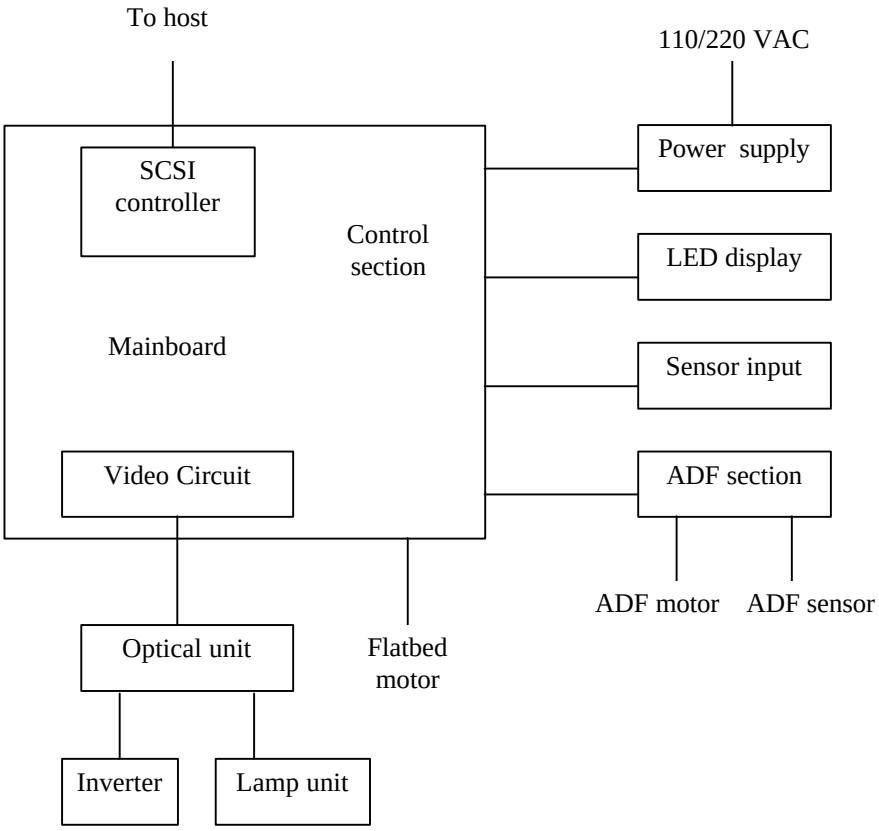


Figure 1-1 System Block Diagram

1.2 Device Configuration

1.2.1 Outer View

Figure 1.2 shows the outer view and device configuration of the ScanPartner 600C/OEM SP600C.

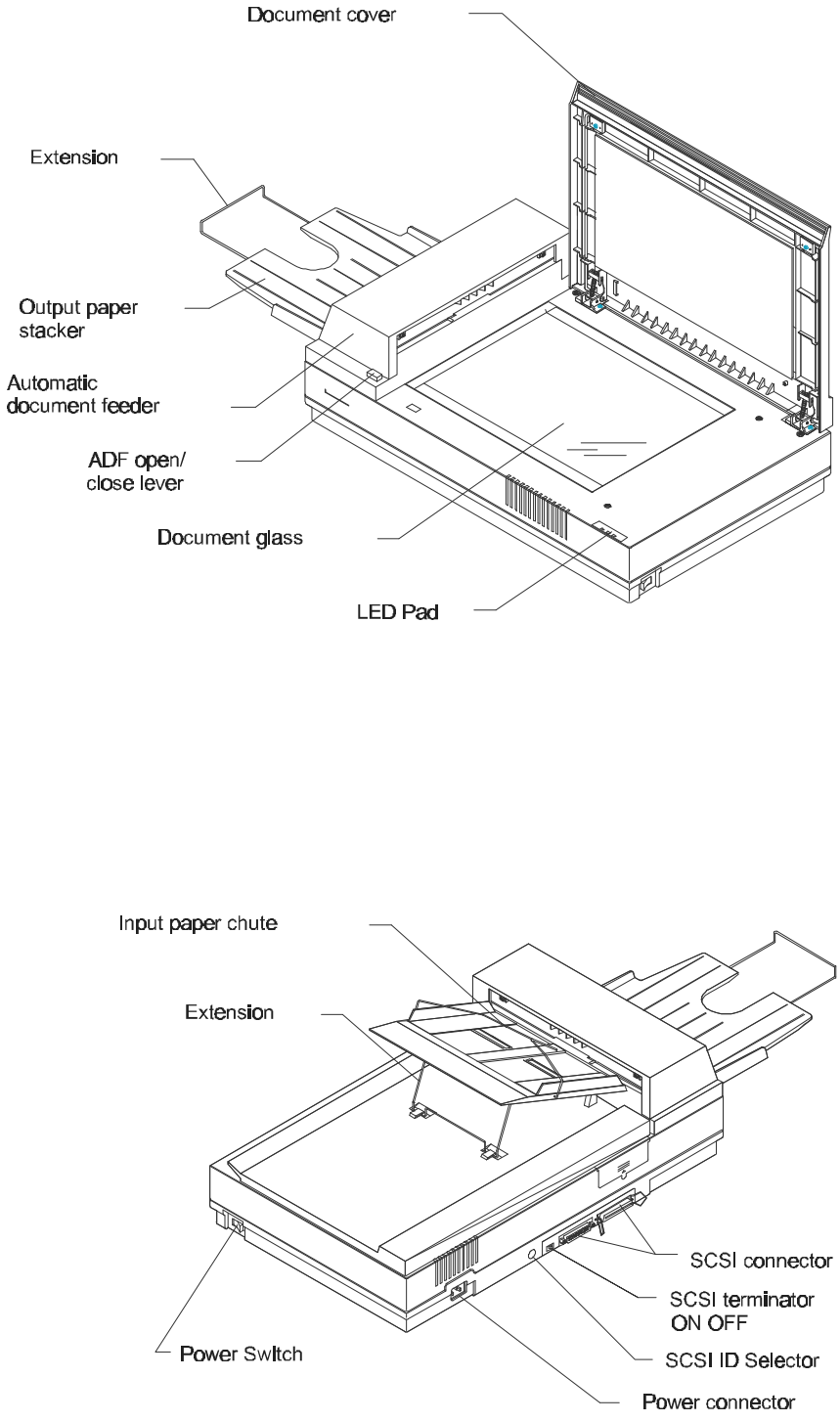


Figure 1-2 ScanPartner 600C Outer View

1.2.2 Components

1. Document Cover
The document cover holds the document in place during scanning so that the document does not move.

2. Document glass
Place the document to be read on the document glass.

3. Automatic document feeder (ADF)
The automatic document feeder (ADF) feeds documents in the scanner automatically.

4. Paper tray extension
The extension prevents documents from bending.

5. Power switch
The power switch is used to turn the scanner on and off.

6. LED panel
The LED panel indicates the status of the scanner (Power, Ready, and Jam).

7. Input paper chute
The input paper chute stacks the documents to be fed by the ADF.

8. ADF open/close lever
The ADF open/close lever is used to open and close the ADF to remove paper jammed in the ADF.

9. Power connector
The power cable is connected to the power connector to supply the scanner with AC power.

10. SCSI interface connector
The interface is connected to the interface connector. The scanner is connected to the host system through the interface cable.

2. Specifications

2.1 Functional Specifications

Table 2.1 lists the functional specifications.

Table 2-1 Functional Specifications

No.	Item	Specifications	Remarks
1	Technology	CCD linear image sensor	4.2 MHz
2	Operating method	Flatbed scanning/ADF scanning	
3	Maximum document size	Legal (11x14) for ADF	
		Letter/A4 for flatbed	
4	Light source	Cold cathode fluorescent lamp	
5	Optical resolution	600 x 1200 dpi	
6	Scanning speed	Letter: 3 sec/200 dpi	
		A4: 3.2 sec/200 dpi	
		Legal: 3.5 sec/200 dpi	
7	Gray scale	256 steps, 16 steps	
8	Halftone	Provides four halftone patterns	
9	Automatic document feeder 1. Paper chute capacity 2. Stacker capacity 3. Reading speed 4. Paper empty detection 5. Cover open detection	 Maximum 50 pages (legal, 14-28 lbs.) Maximum 50 pages (legal, 14-28 lbs.) Letter size paper 200 dpi = 15 ppm Provided Provided	
10	Interface	SCSI 2	

2.2 Environmental Specifications

Table 2.2 lists the environmental specifications.

Table 2-2 Environmental Specifications

No.	Item		Specifications	Remarks
1	Physical dimension (mm)	Height	165 ± 2mm	6.3 ± 0.08 inches
		Width	568 ± 2mm	22.36 ± 0.08 inches
		Depth	348 ± 2mm	13.7 ± 0.08 inches
2	Weight		13.3 kg	24.89 lbs
3	Power requirements	Voltage (VAC)	100- 240V (Auto switching)	
		Frequency (Hz)	47 to 63	
		Power cable length (m)	3 or less	
4	Power consumption (watts)	Operaing	35 watts	
		Non-opearting	13 watts	
5	Acoustic noise (dB)		Operating: 56 dBA or less	
			Standby: 46 dBA or less	
6	Temperature (ºC)	Operating	10 to 40ºC (50ºF to 104ºF)	Gradient: 10ºC/hr. (18ºF/hr.)
		Non-operating	-40 to 60ºC(-40ºF to 140ºF)	
7	Relative humidity (%)	Operating	10% to 90% RH	No condensation
		Non-operating	10 to 90 RH	
8	Vibration (G)	Operating	0.25	5-22-500 Hz Direction = 3 Axial
		Non-operating	1.0	
9	Safety Regulations		UL1950, 3rd Edition CSA C22-2 No. 950-M93 European Norm EN 60950: 1988+A1+ A2	
10	EMC		FCC Part 15 Subchapter J Class B DOC Class B (Canada) European Directive 89/336 (CE-Mark)	

3. OPERATION

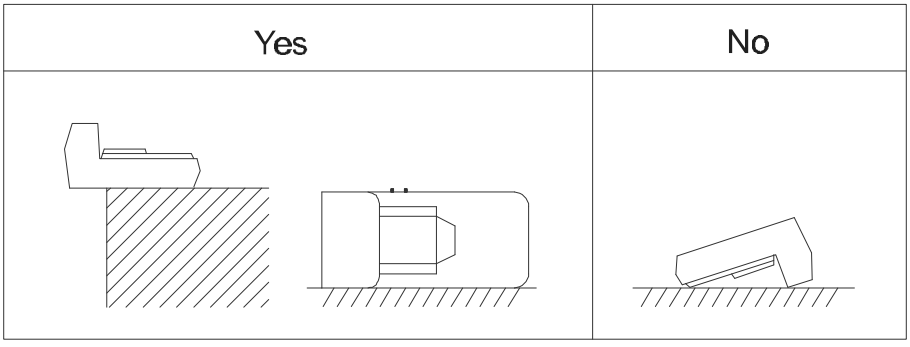
3.1 Removing the Shipping Bracket

The scanner has a bracket that fixes the position of the carrier unit during transportation. The bracket must be removed from the base of the scanner.

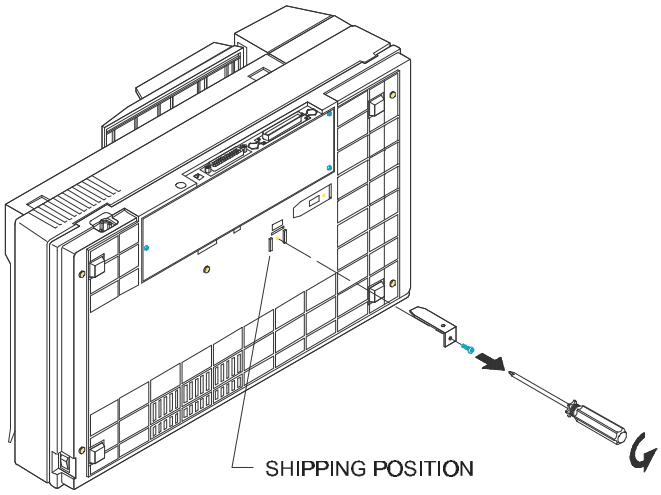
If the power is turned on before the bracket has been removed, the Alarm lamp turns on. Before proceeding, turn off the power, disconnect the power cable, and remove the bracket.

CAUTION

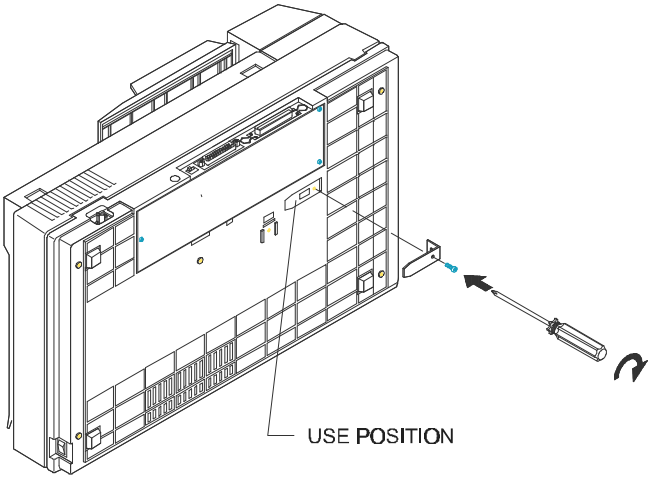
Do not turn the scanner upside down when removing the bracket.



1. Remove the shipping retainer



2. Fasten the shipping retainer



3.2 Power On/Off

The power switch is on the right side of the image scanner (See Figure 3.1)

Turn the power switch to the “I” side, the power LED on the indication panel will light on.
Turn the power switch to the “O” side, the power LED on the indication panel will go out.

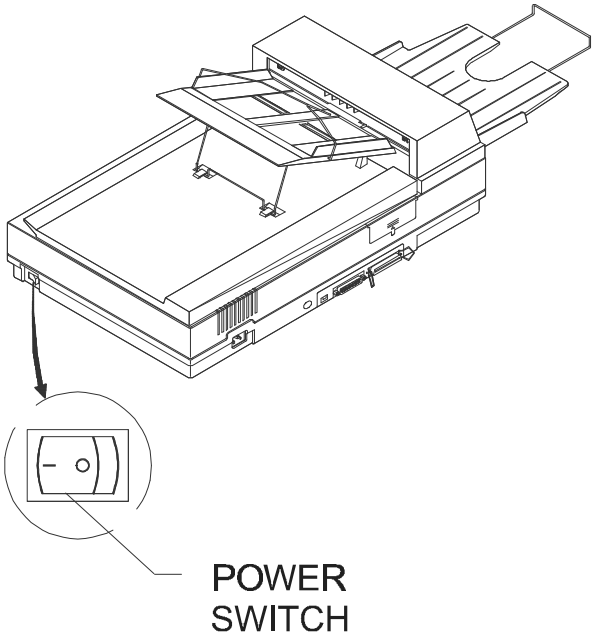


Figure 3-1 Power Switch

3.3 Indication Panel

Figure 3.2 shows the indication panel, and Table 3.1 lists the names and functions of the indicator.

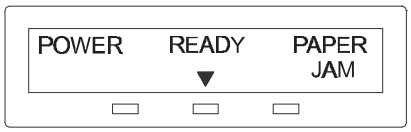


Figure 3-2 Indication Panel

Table 3-1 Names and functions of the indicators

Name	Color	Function
Power	Amber	Lights on when the power is turned on
Ready	Green	Lights on when the scanner is ready to receive commands from the host computer
Paper jam	Red	Lights on when paper jam occurs. This indicator along with Ready indicator also indicates other error conditions. See Chapter 5 Test Mode for details.

3.4 Setting the SCSI ID and Connecting the Interface Cable

Use the address switches to set the device address.

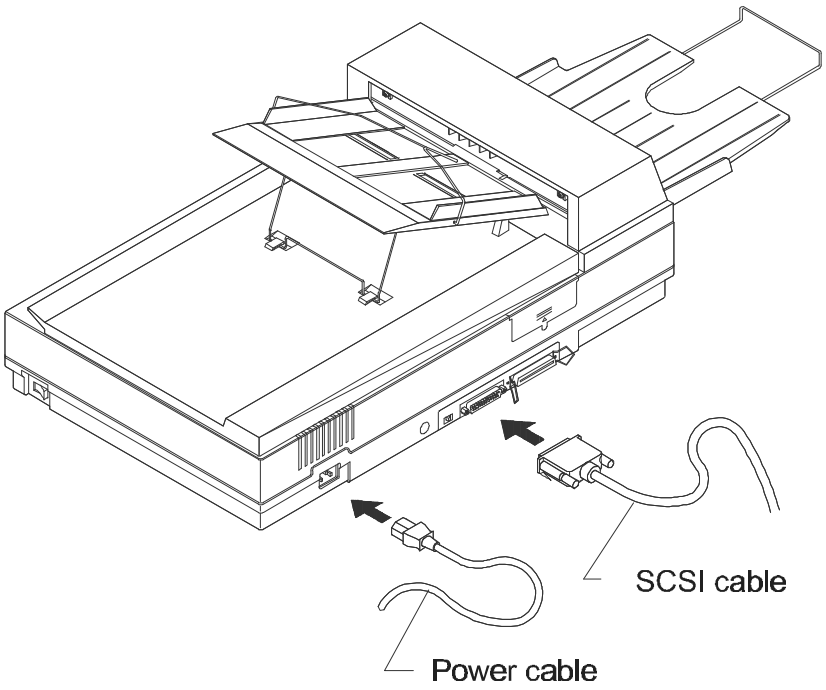


Figure 3-3 Signal cable connection

ID	Content
0 to 7	Available
8	Offline self-test

Table 3-2 SCSI ID setting

The devices linked to the SCSI interface are daisy-chained with one another. A terminator is attached to the ends of the interface cable. User can buy the SCSI cable in computer stores. The specifications of the SCSI cable is as shown below.

Name: SCSI Cable

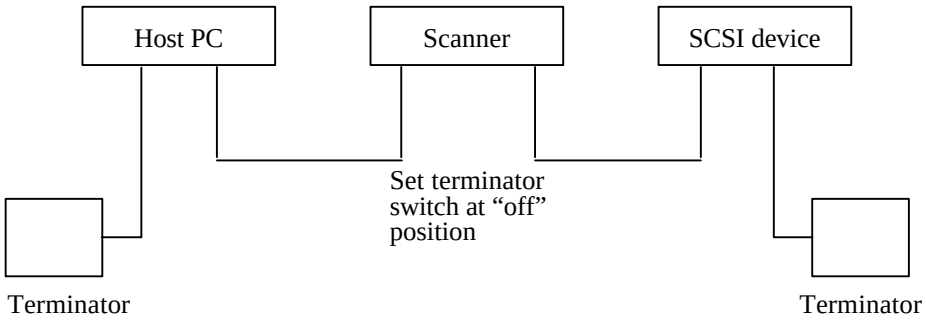
Cable Specification *50* pins to *25 or 50* pins, shielded Amphenol

Cable Length: Less than or equal to 6 meters.

3.4.1 SCSI Cable Connection

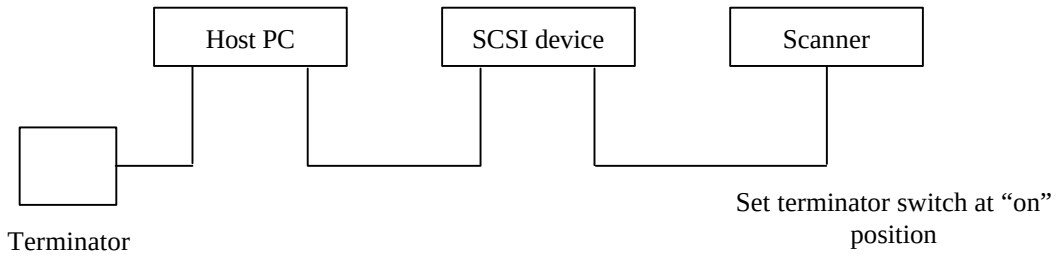
There are two configurations for the connection.

Configuration I: The number of devices attached to the SCSI bus (including the host PC) is three. The scanner is located in the middle of the connection, as shown below.



1. Set scanner’s SCSI terminator switch off.
2. Plug one end of the SCSI cable into the SCSI connector of the host PC, and the other end of the cable to the scanner.
3. Plug one end of the SCSI cable into the SCSI connector of the third device, and the other end of the cable to the other scanner.

Configuration II: the number of devices attached to the SCSI bus (including the host PC) is three. The scanner is located at the end of the connection, as shown below.



If there is already another device linked to the host via SCSI cable, remove the terminator from that device. If the terminator can not be removed, it is recommended that the connection of Configuration I be used.

1. Set scanner’s SCSI terminator switch on
2. Plug one end of the SCSI cable to one female connector of the previous device or the host.

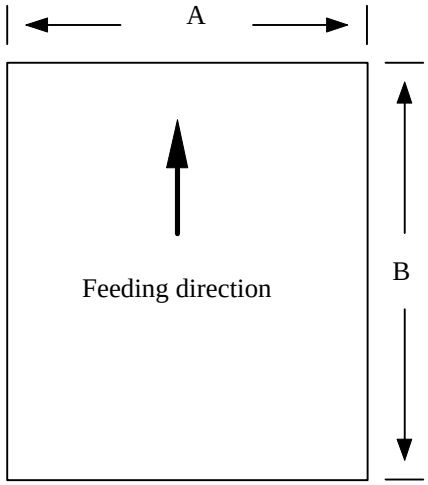
SCSI specifications require that:

1. Only one terminator may be attached to each end of the daisy chain.
2. The total length of the daisy chain must not exceed 6 meters. The vendor suggests that the SCSI cable be two or three meters in length to allow other devices to be attached to the SCSI bus.
3. Each device on the chain will be assigned a different ID. Devices with the same SCSI ID will cause them to malfunction.
4. There is no restriction on the position of the devices on the daisy chain.

3.5 Paper Specifications

This section provides the readable paper specifications for the automatic document feeder (ADF).

3.5.1 Paper Size



Maximum		Minimum	
A	B	A	B
216	356	100	100

Unit: mm

Figure 3-4 Paper size specifications

3.5.2 Paper conditions

3.5.2.1 ADF

a) Paper quality
Wood-free paper
PPC paper; Specified by XEROX Corporation

b) Paper specifications
Legal size, 14~28 lbs

3.5.2.2 FIatbed

(a) Paper quality
No condition

(b) Ream weight
No condition

(C) Paper form
Square is preferred.

3.5.2.3 Items to avoid

Paper such as the following cannot be fed by ADF.

(a) Paper with clips or staples.

(b) Paper with ink not dry.

(C) Paper with inconsistent thickness, such as an envelope.

(d) Paper with large rumples or curls.

(e) Paper with folds or tears.

(f) Tracing paper.

(g) Coating paper.

(h) Carbonless paper.

(i) Paper smaller than A5 size or larger than A4 width.

(j) Items other than paper, such as clothes, metal sheet, or OHP film.

(k) Photographic paper.

(1) Paper that has notches on its side.

(m) Paper that has a shape other than square.

(n) Very thin paper.

(o) Important document not to be damaged.

Use the flatbed to perform scanning when reading paper of items e to o.

3.5.3 Readable area

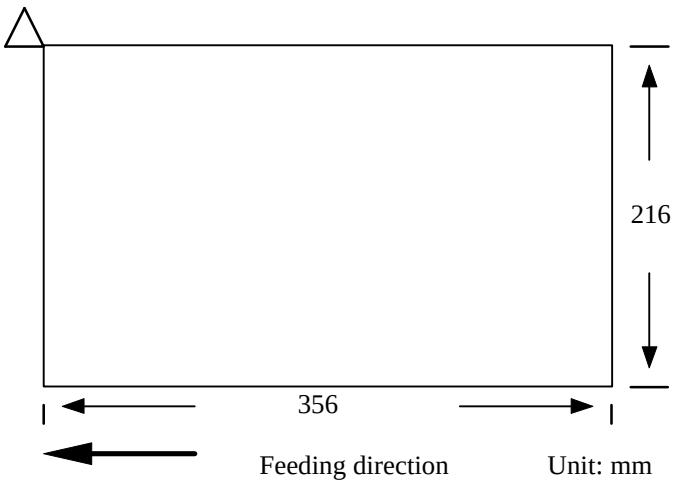


Figure 3-5 ADF readable area

3.6 Document Setting Method

3.6.1 Flatbed

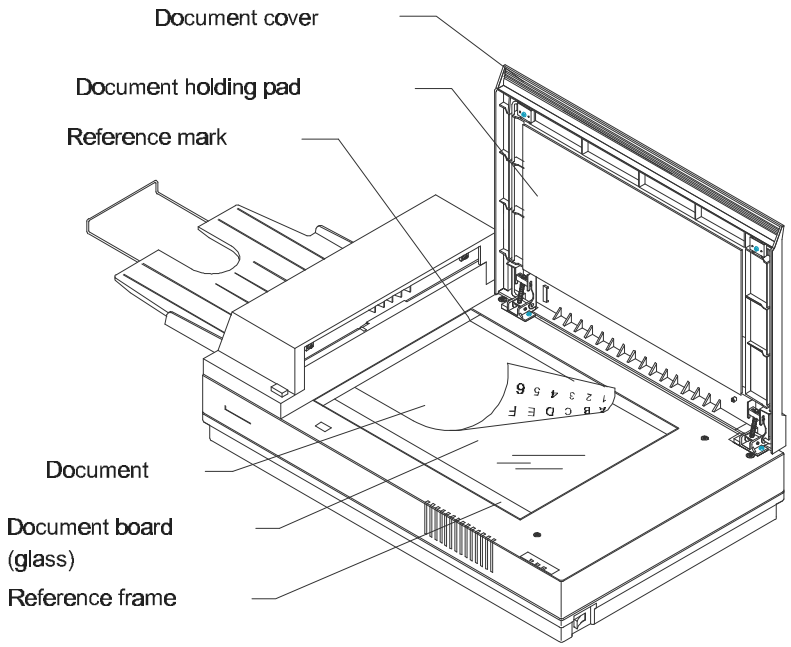


Figure 3-6 Flatbed reading

3.6.1.1 When the document size is of letter/A4 size or smaller

If the document is to be read on the flat-bed, following the steps below.

1. Open the document cover.
2. Put the document on the document glass with the image face down with the upper end to the left. Correct any curls or folded documents.
3. Position the left side and upper end of the document in line with the reference frame so that the upper-left comer of the document coincides with the upper-left of the reference frame.
   If the document is not set correctly, reading is not done correctly.
4. Close the document cover slowly.
   If the document cover is closed too quickly, the document may be moved. During reading, do not press or open the document cover.
5. Start the reading.
6. After reading ends, open the document cover and remove the document.

3.6.1.2 When the document is a thick book

1. Open the document cover and place it on the glass surface.
2. If the document is thick, do not close the document cover.

That part of the document in close contact with the glass will be read correctly but any part that is not in contact with the glass may be unclear or distorted so care must be taken.

3.6.2 ADF

3.6.2.1 Setting the ADF paper chute

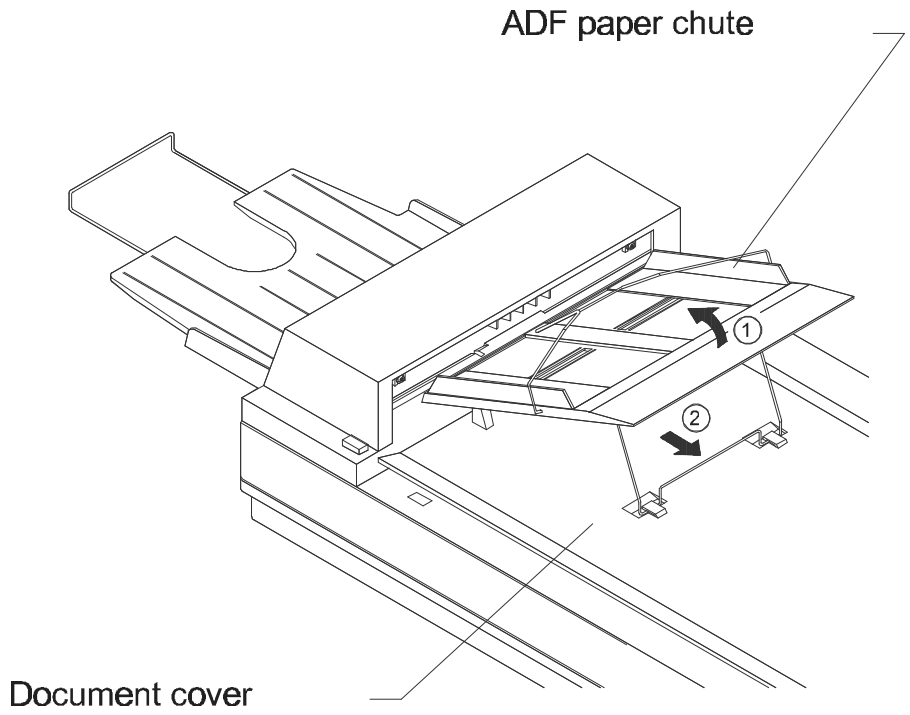


Figure 3-7 Setting the ADF paper chute

To use ADF to read the documents, set the ADF paper chute as follows:

1. Raise the unattached end of the input paper chute to about 45 degrees, as shown in Figure 3.7.
2. Pull down the metal bracket from under the paper chute.
3. Click the metal bracket into the grips on the document cover.
4. Pull the chute extension up.

3.6.2.2 Placing the documents on the ADF paper chute

Perform the following steps to place the document in the ADF paper chute. If these steps are not followed closely, a feed error may occur.

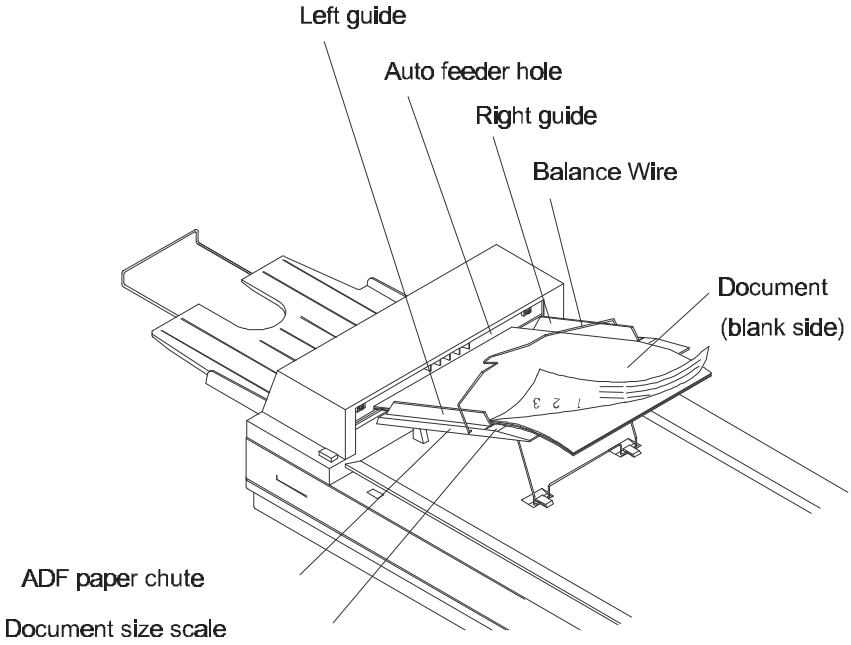
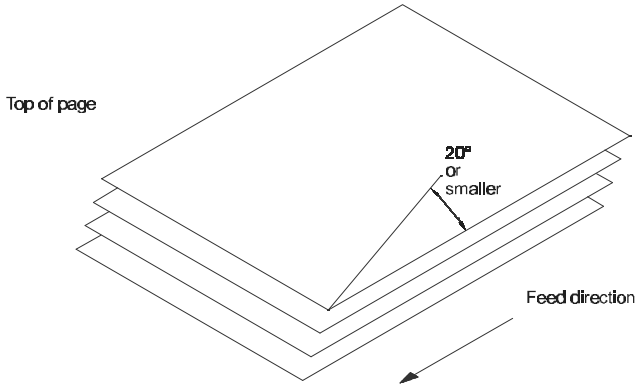


Figure 3-8 Placing the document on the ADF paper chute

1. Place the document upside-down.
2. Angle the document sheets as shown. (See "Angling the document sheets" that follows for an explanation of this procedure.)



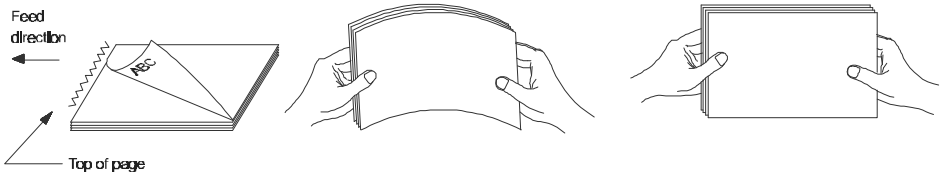
3. Spread open the right and left guides of the ADF paper chute, and set them approximately 5 mm wider than the document width.

4. Place the document face down on the ADF paper chute, and put the ends of the bottom 2 or 3 sheets into the auto feeder.
5. C]ose the right and left guides against side of the document. (Skewing may occur if a gap exists between the guides and document.)
6. Slide the pages down into the chute until they hit the far end of the auto feeder hole.

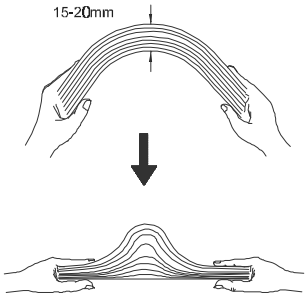
(a) Angling the document sheets

1. Place the document face down on a flat surface, with the top of the page to the left (a).
2. Lift the sheets with both hands. Take a maximum 4 mm thickness of sheets.
3. Hold the sheets tightly with your left hand and bend the sheets as shown in (b).

4. Then grip tightly with your right hand, loosen the grip of your left hand, and straighten the sheets as shown in (c).
5. Repeat operations 3 and 4 as often as necessary with the entire document has been angled.



(b) Separating the sheets for easy feeding



Take a 2 to 4 mm thickness of sheets. Lightly hold both ends with both hands. Bend the sheets as shown. Hold the sheets tightly with both hands then straighten the sheets. This operation separates the sheets for easy feeding into the ADF. Repeat this operation two or three times. Turn the stack of sheets over and repeat the entire operation.

3.7 Cleaning

3.7.1 Cleaning the document cover and the document glass

Use a clean and soft cloth moistened with non-corrosive solvent such as alcohol (with purity above 99.5%) and wipe the document cover and flatbed document glass slightly, as shown in Figure 3.9.

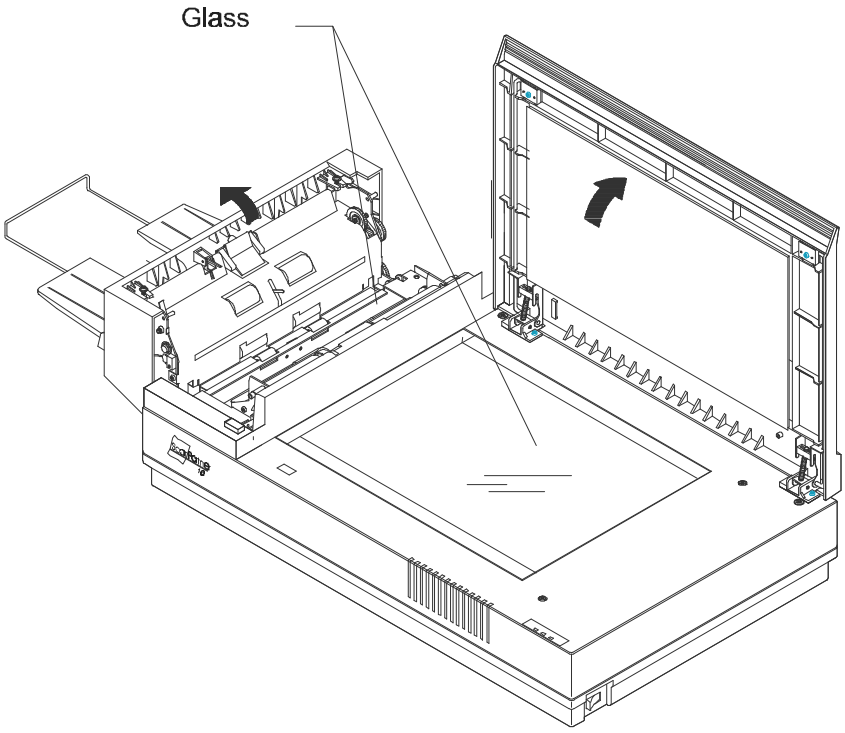


Figure 3-9

3.7.2 Cleaning inside the ADF

Clean the ADF according to the procedure that follows when the following situations frequently occur:

- Documents are not fed smoothly.
- Several documents are fed in at the same time.
- Reading result is poor.

Cleaning Procedure:

1. Push the ADF cover release button, and open the ADF module.
2. Figure 3.10 shows the locations of pad, scrub roller, feeding rollers and follow rollers, and ADF calibration white sheet.

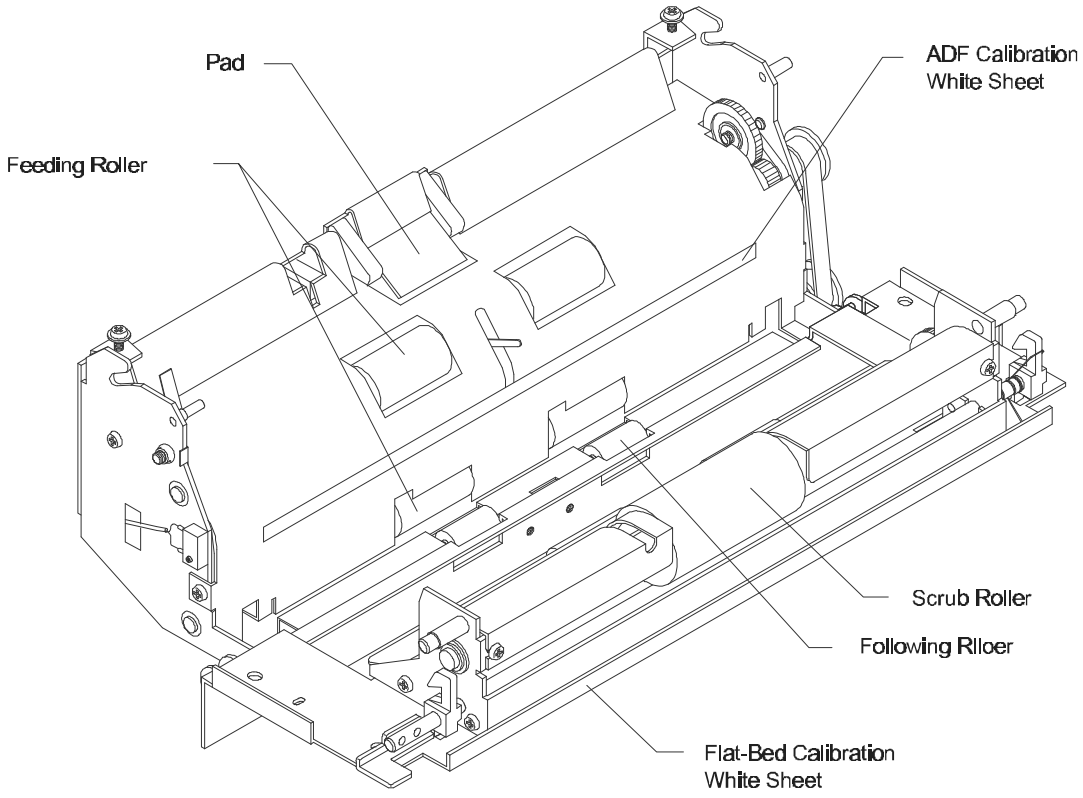


Figure 3-10

3. Use a clean and soft cloth moistened with a non-corrosive solvent like ALCOHOL (with purity above 99.5%) and wipe them slightly.

4. INTERFACE

This image scanner and the host are connected via an 8-bit parallel interface. The interface follows the ANSI (American National Standards Institute) SCSI 2 (Small Computer System Interface 2) Revision 10c.

This chapter provides an overview of SCSI (minimum information necessary for understanding this scanner), as well as descriptions peculiar to the scanner. For details of SCSI, refer to the ANSI standard,

The following terms are needed to understand this section.

SCSI device: A host adapter or a target controller that can he attached to the SCSI bus

Initiator: An SCSI device (usually a host system) that requests an I/O process to be performed by another SCSI device (a target).

Target: An SCSI device that performs an operation requested by an initiator

Logical Unit: A physical or virtual peripheral device that is addressable through a target

Range of support

1. System Configuration

This scanner operates under the multiinitiator, multitarget environment. An initiator function is not provided. This scanner incorporates an integrated target and logical unit (image scanner).

SCSI-ID:0 to 7, variable by DIP switch Logical unit number (LUN): 000, fixed

2.Bus phases

This scanner supports all phases except reselection phase.

3. Commands

   The following commands are supported by this scanner:

   - INQUIRY
   - OBJECT POSITION
   - READ
   - RELEASE UNIT
   - REQUEST SENSE
   - RESERVE UNIT
   - SEND DIAGNOSTIC
   - SET WINDOW
   - TEST UNIT READY
   - SCAN

   A control byte is not supported. If value other than X’OO' is specified. an error is generated.

4. Statuses

   The following statuses are supported by this scanner:

   - BUSY
   - CHECK CONDITION
   - GOOD
   - RESERVATION CONFLICT

5. Messages

   The following messages are supported by this scanner:

   - ABORT
   - BUS DEVICE RESET
   - COMMAND COMPLETE
   - IDENTTIY
   - INITIATOR DETECTED ERROR
   - MESSAGE PARITY ERROR
   - MESSAGE REJECT
   - NO OPERATION

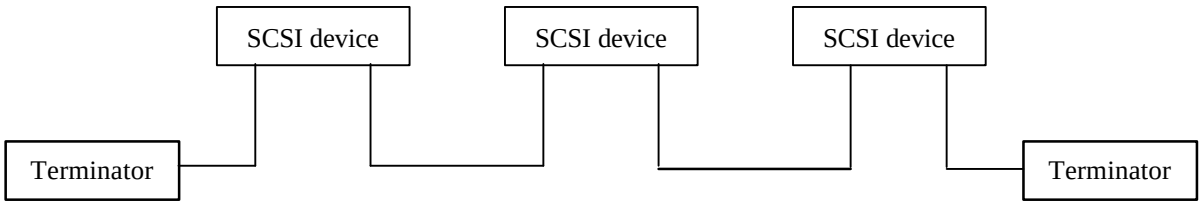
6. Others

   The bits and fields for which the word 'Reserved" is described are checked. For a non-zero, an error is returned.

4.1 Physical Specifications

The devices linked to this interface are daisy chained with each other. A terminator is attached to the ends of the interface cable. Interface specifications are as shown below

4.1.1 Connection

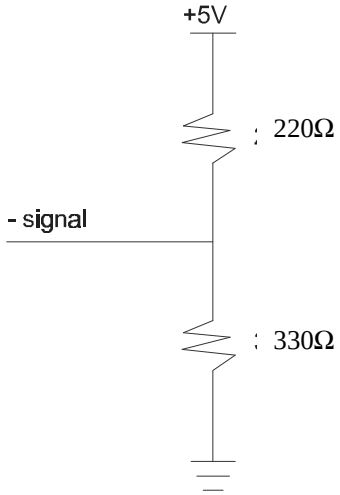


4.1.2 Physical Specification

Table 4-1 SCSI physical specifications

Item		Specifications
Driver/Receiver		Single-ended
Connector		50 Contact Shielded Low Density
Cable	Max. cable length	6 m
	Characteristic impedance	132 Ω
	Cable type	25 signal twisted pair
	Stub wire	≤ 0.1 mm (from main cable in scanner to internal wiring)
Signal level	Terminator	See the figure under (3).
	Driver/receiver	Open collector or three-state driver
	Output characteristics	Low level (true) = 0.0 to 0.5 VDC High Level (false)=2.5 to 5.25 VDC Output current = 48 mA (corresponding output voltage ≤ 0.5V)
	Input characteristics	Low level (true) = 0.0 to 0.8 VDC High level (false) = 2.0 to 5.25 VDC Input load = -0.4 mA max. (at 0.4V input voltage Input hysteresis = 0.2 VDC min.
Connector pin assignments for lines		See (4).

4.1.3 Termination



4.1.4 Pin assignments

Physical Specifications

Signal Name	Pin Number		Signal Name
GND	1	26	-DB (0)
GND	2	27	-DB(1)
GND	3	28	-DB(2)
GND	4	29	-DB(3)
GND	5	30	-DB(4)
GND	6	31	-DB(5)
GND	7	32	-DB(6)
GND	8	33	-DB(7)
GND	9	34	-DB(P)
GND	10	35	GND
GND	11	36	GND
Reserved	12	37	Reserved
(Open)	13	38	TERMPWR
Reserved	14	39	Reserved
GND	15	40	GND
GND	16	41	-ATN
GND	17	42	GND
OND	18	43	-BSY
OND	19	44	-ACK
GND	20	45	-RST
GND	21	46	-MSG
GND	22	47	-SEL
GND	23	48	-C/D
GND	24	49	-REQ
GND	25	50	-I/O

Note: Reserved pins are connected to GND.

Figure 4-1Pin assignment

4.2 SCSI Bus

4.2.1 System configuration

4.2.1.1 System configuration

The SCSI bus connects up to eight SCSI units, each linked with a daisy chain. Both ends of the daisy chain require a terminator.

Each SCSI unit operates as an initiator or a target, so that a series of operations are performed between an initiator and target pair.

The system may be configured with any combination of initiators and targets as long as the number of the initiators and targets combined does not exceed eight.

4.2.1.2 Addresses of SCSI devices

Every SCSI device on the bus is assigned a unique address (SCSI ID) that corresponds to the data bus bit number; ID#7 through ID#10 correspond to DB7 through DB0. The SCSI ID provides identification for specifying particular SCSI device when an initiator selects a target or when a target reconnects an initiator.

SCSI ID also represents the priority for using the bus in the arbitration phase. (A description regarding the bus phase is given later;) Priorities are given in the descending order of data bus bit numbers (DBn), with the highest priority placed on ID#7(DB7) and the lowest priority on ED#0(DB0).

4.2.1.3 Peripheral equipment

With the basic specification, an initiator can designate up to eight peripheral devices (logical units) belonging tt a single target, where the peripheral devices are used as the I/O units of the initiator; Logical units are identified and selected by specifying their LUNs (logical unit numbers) in the IDENTIFY message or command (CDB: command descriptor block).

This scanner is equipped with a target and a logical unit, and its LUN is 000.

4.2.2 Bus signals

Table 4-2 Bus signals

Signal name		Type of signal	Initiator ⇐ ⇒ Target
Data	DB0 DB1 DB2 DB3 DB4 DB5 DB6 DB7 (Data Bus n) DBP (Data Bus Parity)	Eight data-bit signals, plus a parity-bit signal that forms a DATA BUS. DB(7) is the most significant bit and has the highest priority during the ARBITRATION phase. Bit number, significance and priority decease downward to DB(O). A data bit is defined as one when the signal value is true. A data bit is defined as zero when the signal value is false. Data parity DB(P) shall be odd. Parity is undefined during the ARBITRATION phase.	⇐ ⇒
Control Signals	BSY (Busy)	An "ORtied" signal that indicates that the bus is being used	⇐ ⇒
	SEL (Select)	An "ORtied" signal used either by an initiator to select a target or by a target to reselect an initiator	⇐ ⇒
	RST (reset)	An "ORtied" signal that indicates the RESET condition	⇐ ⇒
	C/D (Control/Data) I/O (Input/Output) MSG Message	The C/D, I/O, and MSG signals are used to distinguish between the different information transfer phases.	⇐
	REQ (request)	A signal driven by an initiator to indicate a request for a REQ/ACK data transfer handshake	⇐
	ACK (acknowledge)	A signal driven by an initiator in indicate and acknowledgment for REQ/ACK data transfer handshake.	⇒
	ATN (Attention)	A signal driven by an initiator to indicate the ATTENTION condition	⇒

4.2.3 Bus signal drive conditions

SCSI devices drive signals of the SCSI bus. The types of SCSI devices are summarized in the following table, showing the signals that they can drive for each operating phase of the interface.

There are two kinds of signal driving methods, OR tied and NON-OR tied, as shown in Table 4.2. During an interface operating sequence. the BSY signal could be driven simultaneously by two or more SCSI units when the data bus is in the ARBITRATION or RESELECTION phase. This situation also occurs with the RST signs (Reset). These two signals must be ORtied. For other signals, either of the two methods may be used: further more, different drive methods may coexist for a signal on the bus.

Table 4-3 Bus phases vs. signal drive sources (1/2)

Signal / Bus phase	BSY	SEL	'10	C/D MSG	REQ	ACK	DB7 to 0 DBP	ATN	RST
BUSFREE	N	N	N	N	N	N	N	N	A
ARBITRATION	A	W	N	N	N	N	ID	N	A
SELECTION	I&T	I	N	N	N	I	I	I	A
RESELECTION	l&T	T	T	T	T	I	T	I	A
COMMAND	T	N	T	T	T	I	I	I	A
DATAIN	T	N	T	T	T	I	T	I	A
DATAOUT	T	N	T	T	T	I	I	I	A
STATUS	T	N	T	T	T	I	T	I	A
MESSAGE IN	T	N	T	T	T	I	T	I	A
MESSAGE OUT	T	N	T	T	T	I	I	I	A

N: The signal shall be released, since it is not being driven by any SCSI device.

A: The signal shall be driven by all SCSI devices that are actively arbitrating.
I: If driven, this signal be driven only by the active initiation
T: If the signal is driven, it shall be driven only by the active target.
W: The signal shall be driven by the one SCSI device that wins arbitration.
ID: A unique data bit (the SCSI ID) shall be driven by each SCSI device that is actively arbitrating. The other seven data bits shall be released (shall not be driven) by this SCSI device. The parity bit (DB(P)) may be released or driven to the true state, but shall never be driven to the false state during this phase.
I&T: The initiator and target drive the signal according to the interface operating sequence. The RESELECTION phase includes a sequence in which the initiator and target simultaneously drive the signal.

The signal shall be driven by the initiator, target, or both, as specified in the SELECTION phase and RESELECTION phase.

Table 4-4 Method of driving the interface signal

	OR connection	NON_OR connection
False	No signal is driven by any SCSI device. Signal status is made false by the termination resistor circuits.	The signal is driven false by a certain SCSI device (initiator or target), or is not driven by any SCSI device
True	A SCSI device drives the signal true.	

4.3 Bus Phases

The SCSI architecture includes the following eight distinct phases:

- BUS FREE phase
- ARBITRATION phase
- SELECTION phase
- COMMAND phase
- DATA phase
- STATUS phase
- MESSAGE phase

} INFORMATION TRANSFER phase

The SCSI bus can never be in more than one phase at any given time.

The following diagram shows how each phase transmits to another.

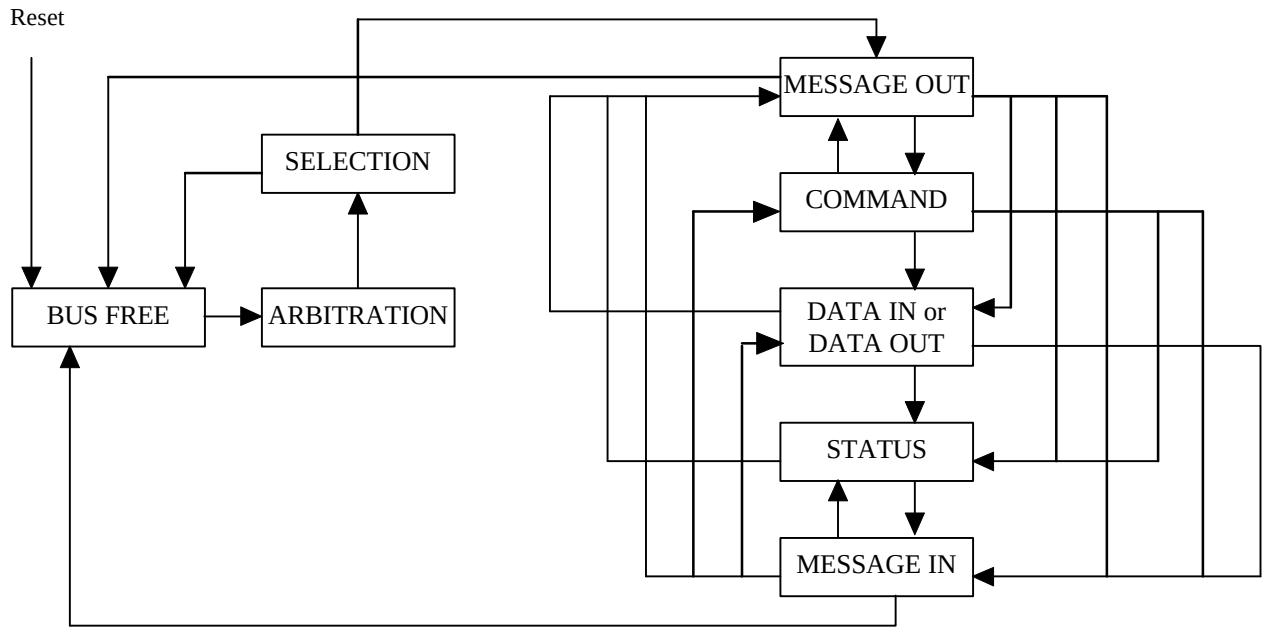


Figure 4-2 Phase sequence

The signal delay times for each bus phase are defined as follows-

Table 4-5 Signal delay times definition

No.	Item	Time	Definition
1	Arbitration delay	2.4 æs	The minimum time an SCSI device shall wait from asserting BSY for arbitration until the DATA BUS can be examined to see if arbitration has been won. There is no maximum time.
2	Assertion period	90 ns	The minimum time that a target shall assert REQ (or REQB) while using synchronous data transfers. Also, the minimum time that an initiator shall assert ACK while using synchronous data transfers.
3	Bus Clear delay	800 ns	The maximum time for an SCSI device to stop driving all bus signals after: (1) The BUS FREE phase is detected (BSY and SEL both false for a bus settle delay) (2) SEL is received from another SCS] device during the ARBITRATION phase (3) The transition of RST to true. For the first condition listed. the maximum time for an SCSI device to clear the bus is 1200 nanoseconds from BSY and SEL first becoming both false. If an SCSI device requires more than a bus settle delay to detect BUS FREE phase, it shall clear the bus within a bus clear delay minus the excess time
4	Bus free delay	800 ns	The minimum time that an SCSI device shall wait from its detection of the BUS FREE phase (BSY and SEL both false
5	Bus set delay	1.8 _s	The maximum time for an SCSI device to assert BSY and its SCSI ID bit on the DATA BUS after it detects BUS FREE phase (BSY and SEL both false for a bus settle delay) for the purpose of entering the ARBITRATION phase
6	Bus settle delay	400 ns	The minimum time to wait for the bus to settle after changing certain control signals as called out in the protocol definitions
7	Cable skew delay	10 ns	The maximum difference in propagation time allowed between any two SCSI bus signals measured between any two SCSI devices.
8	Data release delay	400 ns	The maximum time for an initiator to release the DATA BUS signals following the transition of the I/O signal from false to true.
9	Deskew delay	45 ns	The minimum time required for deskew of certain signals
10	Disconnection	200 æs	The minimum time that a target shall wait after releasing BSY before participating in an ARBITRATION phase when honoring a DISCONNECT message from the initiator

Table 4.5 Signal delay times definition

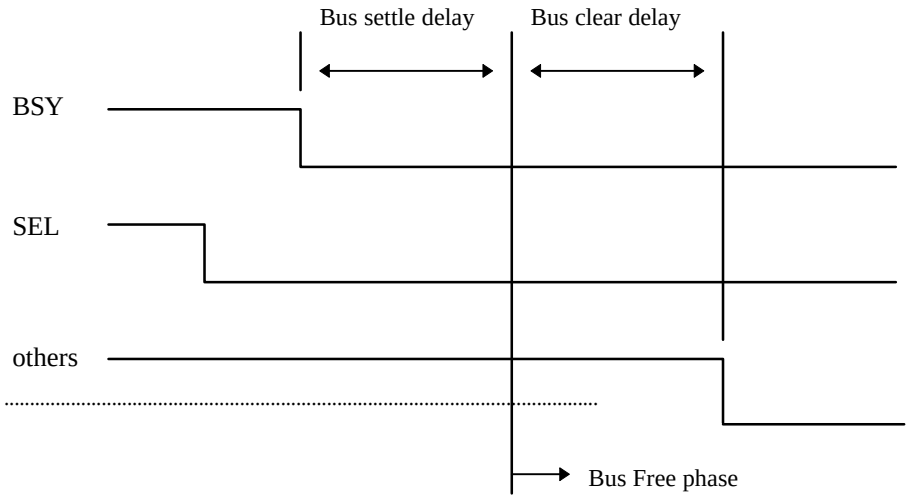
No.	Item	Time	definition
11	Hold time	45 ns	The minimum time added between the assertion of REQ (Or REQB) or ACK (or ACKB) and the changing of the data lines to provide hold time in the initiator or target while using synchronous data transfers. REQB and ACKIB timings only apply to optional wide data transfers.
12	Negation	90 ns	The minimum time that a target shall negate REQ (Or REQB) while using synchronous data transfers. Also, the minimum time that an initiator shall negate ACK (or ACKB) while using synchronous data transfers. REQB and ACKB timings only apply to optional wide data transfers.
13	Power-on to selection time	10 sec (recommended)	The recommended maximum time from power application until an SCSI target is able to respond with appropriate status and sense data to the TEST UNIT READY, INQUIRY, and REQUEST SENSE commands
14	Reset to selection time	250 ms (recommended)	The recommended maximum time after a hard RESET condition until an SCSI target is able to respond with appropriate status and sense data to the TEST UNIT READY, INQUIRY and REQUEST SENSE commands
15	Reset hold	25 æs	The minimum time over which RST must be kept asserted
16	Selection abort time	200 æs	The maximum time required from the moment when selection or deselection of an initiator or target is detected until BSY is asserted
17	Selection timeout delay	250 ms (recommended)	The minimum time required for an initiator or target in the selection or deselection phase to wait for a BSY response before it starts the timeout procedure
18	Transfer period	—	The minimum allowable period, during sync data transfer, between the start of consecutive REQ pulses and the start of consecutive ACK pulses

4.3.1 BUS FREE phase

The BUS FREE phase is used to indicate that no SCSI device is actively using the SCSI bus. and that it is available.

SCSI devices shall detect the BUS FREE phase after the SEL and BSY signals are both false for at least a bus settle delay.

SCSI devices shall release all SCSI bus signals within a bus clear delay after the BSY and SEL signals become continuously false for a bus settle delay.



4.3.2 ARBITRATION phase

The ARBITRATION phase allows one SCSI device to gain control of the SCSI bus so that it can initiate or resume an I/O process. The procedure for an SCSI device to obtain control of the SCSI bus is as follows:

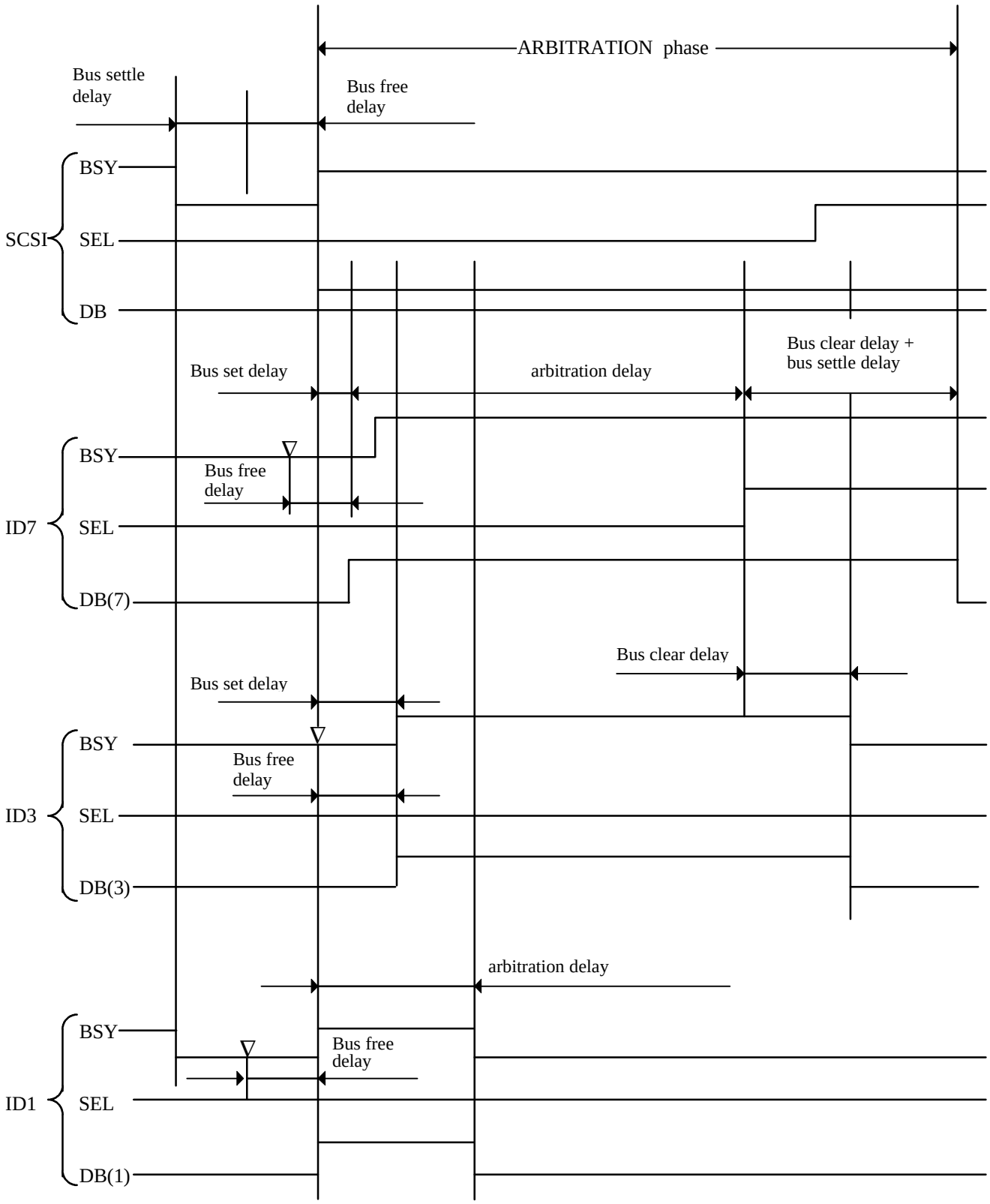
1. The SCSI device shall first wait for the BUS FREE phase to occur;

2. The SCSI device shall wait a minimum of a bus free delay after detection of the BUS FREE phase (i.e. after the BSY and SEL signals are both false for a bus settle delay) before driving any signal.

3 Following the bus free delay in Step 2, the SCSI device may arbitrate for the SCSI bus by asserting both the BSY signal and its own SCSI ID, however, the SCSI device shall not arbitrate (i.e. assert the BSY signal and its SCSI ID) if more than a bus set delay has passed since the BUS FREE phase was last observed.

4. After waiting at least an arbitration delay (measured from its assertion) the SCSI device shall examine the DATA BUS. If a higher priority SCSI ID bit is true on the DATA BUS (DB(7) is the highest), then the SCSI device has lost the arbitration and the SCSI device may release its signals and return to Step I. If no higher priority SCSI ID bit is true on the DATA BUS, then the SCSI device has won the arbitration and it shall assert the SEL signal. Any SCSI device other than the winner has lost the arbitration and shall release the BSY signal and its SCSI ID bit within a bus clear delay after the SEL signal becomes true. A SCSI device that loses arbitration may return to Step 1.

5. The SCSI device that wins arbitration shall wait at least a bus clear delay plus a bus settle delay after assert mg the SEL signal before changing any signals.



ID7: Succeeds in ARBITRATION
ID3: Detects the SEL signals of other SCSI unit
ID1: Detects the SCSI ID with higher priority than itself
∇ : The point at which the BUS FREE phase is detected by each SCSI unit

4.3.3 SELECTION phase

The SELECTION phase allows an initiator to select a target for the purpose of initiating some target function (e.g., READ or WRITE command). During the SELECTION phase the I/O signal is negated so that this phase can be distinguished from the RESELECTION phase.

1. The SCSI device that won the arbitration has both the BSY and SEL signals asserted and has delayed at least a bus clear delay plus a bus settle delay before ending the ARBITRATION phase. The SCSI device that won the arbitration becomes an initiator by not asserting the I/O signal.

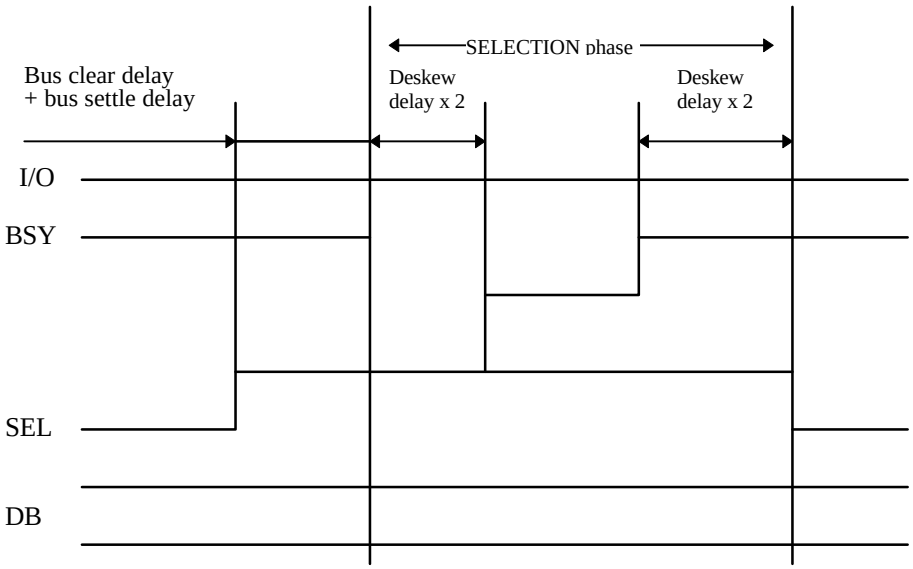
2. The initiator shall set the DATA BUS to a value which is the OR of its SCSI ID but and the target's SCSI ID bit, and it shall assert the ATN signal.

3. The initiator shall then wait at least two deskew delays and release the BSY signal.

4. The initiator shall then wait at least a bus settle delay before looking for a response from the target.

5. The target shall determine that it is selected when the SEL signal and its SCSI ID bit are true and the BSY and I/O signals are false for a least a bus settle delay. The selected target may examine the DATA BUS in order to determine the SCSI ID of the selecting initiator; The selected target shall then assert the BSY signal within a selection abort time of its most recent detection of being selected; this assertion is required for correct operation of the selection time-out procedure.
   The target shall not respond to a selection if bad parity is detected. Also, if more than two SCSI ID bits are on the DAT BUS, the target shall not respond to selection.

6. No less than two deskew delays after the initiator detects the BSY signal is true, it shall release the SEL signal and may change the DATA BUS. The target shall wait until the SEL signal is false before asserting the REQ signal to enter an information transfer phase.



4.3.4 INFORMATION TRANSFER phases

Note:

The COMMAND, DATA, STATUS, and MESSAGE phases are all grouped together as the information transfer phases because they are a]l used to transfer data or control information via the DATA BUS The actual content of the information is beyond the scope of this section.

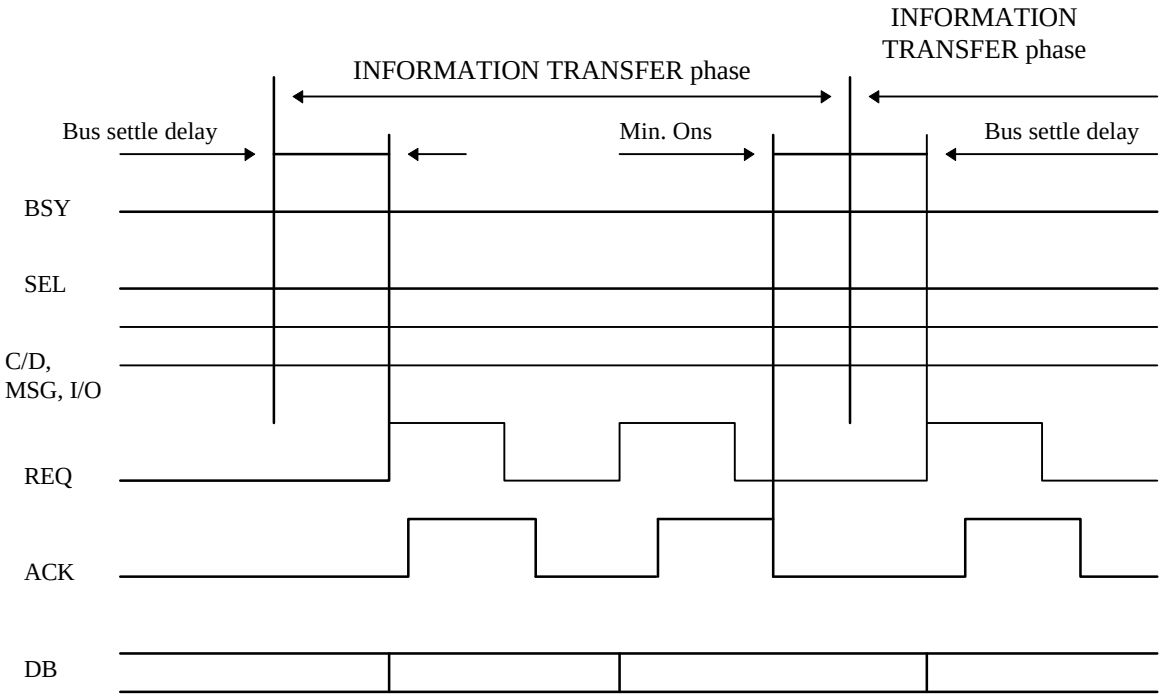
The C/D, I/O, and MSG signals are used to distinguish between the different information transfer phases (see Table 4.5). The target drives these three signals and therefore controls all changes from one phase to another. The initiator can request a MESSAGE OUT phase by asserting the ATN signal, while the target can cause the BUS FREE phase by releasing the MSG, C/D, I/O, and BSY signals.

Table 4-6 INFORMATION TRANSFER phase type

Phase	***C/D***	**I/O**	**MSG**	**DB7 to 9,P**	**Transfer direction**
DATA OUT	0	0	0	Data	INIT ⇒TARG
DATAIN	0	1	0	Data	⇐
COMMAND	I	0	0	Command	⇒
STATUS	I	I	0	Status	⇐
*	0	0	1	—	
*	0	1	I	—	
MESSAGE OUT	1	0	1	Message	⇒
MESSAGEIN	1	1	1	Message	⇐

*: Reserved for future standardization

0: False
1: True
INIT: Initiator
TARG: Target



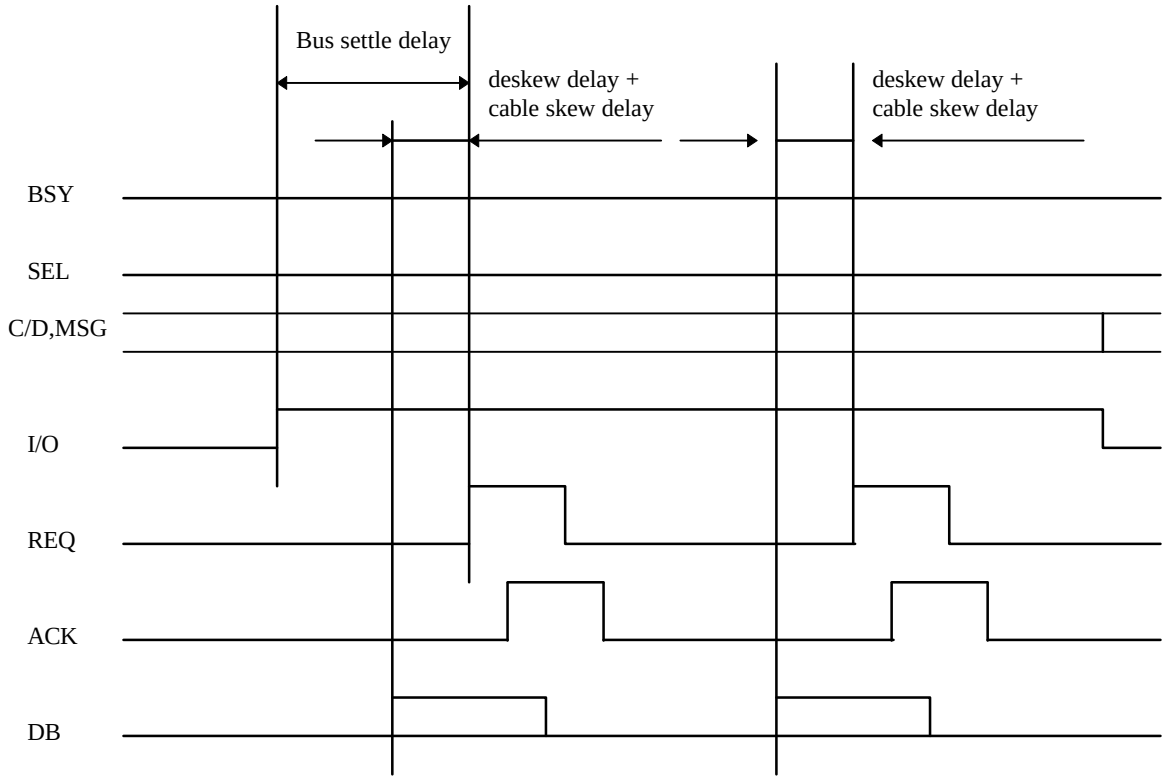
The INFORMATION TRANSFER phases use one or more REQ/ACK handshakes to control the information transfer Each REQ/ACK handshake allows the transfer of one byte of information. During the INFORMATION TRANSFER phases the BSY signal shall remain true and the SEL signal shall remain false. Additionally, during the INFORMATION TRANSFER phases, the target shall continuously envelope the REQ/ACK handshake(s) with the C/D, I/O and MSG signals in such a manner that these control signals are valid for a bus settle delay before the assertion of the REQ signal of the first handshake. These control signals remain valid until after the negation of the ACK signal at the end of the handshake of the last transfer of the phase.

4.3.4.1 Asynchronous information transfer

The target shall control the direction of information transfer by means of the I/O signal. When the I/O signal is true, information shall be transferred from the target to the initiator When the **I/O signal is false,** information shall be transferred from the initiator to the target.

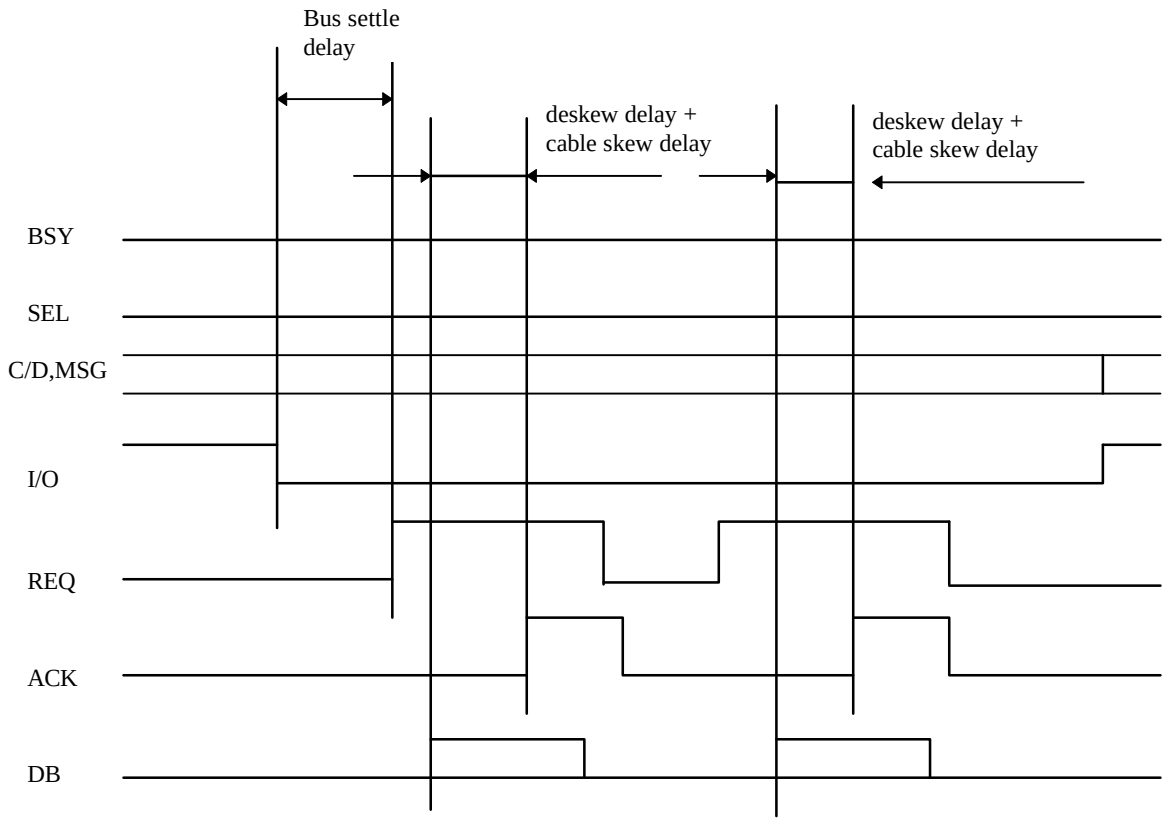
(a) Asynchronous transfer from target to initiator

If the I/O signal is true (transfer to the initiator), the target shall first drive the DB(7-O, P) signals to their desired values, delay at least one deskew delay plus a cable skew delay then assert the REQ signal. The DB (7-0, P) signals shall remain valid until the ACK signal is true at the target. The initiator shall read the DB(7-0, P) signals after the REQ signal is true then indicate its acceptance of the data by asserting the ACK signal. when the ACK signal becomes true at the target, the target may change or release the DB(7-O P) signals and shall negate the REQ signal. After the REQ signal is false, the initiator shall then negate the ACK signal.
After the ACK signal is false, the target may continue the transfer by driving the **DB** (7-0, P) signals and asserting the REQ signal, as previously described.



(b) Asynchronous transler from initiator to target

If the I/O signal is false (transfer to the target), the target shall request information by asserting the REQ signal. The initiator shall drive the DB (7-0, P) signals to their desired values, delay at least one deskew delay plus a cable skew delay then assert the ACK signal. The initiator shall continue to drive the DB (7-0, P) signals until the REQ signal is false. When the ACK signal becomes true at the target, the target shall read the DB (7-0, P) signals then negate the REQ signal. When the REQ signal becomes false at the Initiator, the initiator may change or release the DB (7-0, P) signals and shall negate the ACK signal. The target may continue the transfer by asserting the REQ signal, as previously described.



4.4 Commands

Commands are directions issued from an initiator to a target. This image scanner supports the following range of the commands specified by the SCSI standard.

(a) The identification number of logical unit (LUN: logical unit number) is B'000.'

If this scanner receives a value other than 000, it returns an error as follows:

- Status key: B'0000l'(CHECK CONDITION)
- Sense key: X'5'(ILLEGAL REQUEST)

(b) **Relative addressing is not supported.**

If this scanner receives a relative address (RelAdr) =1, it returns an error as follows:

- Status key: B'OOOOl'(CHECK CONDITION)
- Sense key: X'5'(WLEGAL REQUEST)

(c) A **control byte is not supported.**

If this scanner receives a control byte ≠ X'00', it returns an error as follows:

- Status key: B'0000l '(CHECK CONDITION)
- Sense key: X'5'(ILLEGAL REQUEST)

(d) A bit and field described as "Reserved" are 0.
If this scanner receives a value other than 0, it returns an error as follows:
Status key: B'00001 '(CHECK CONDITON)
Sense key: X~5'(ILLEGAL REQUES~I)

The commands supported by this scanner are listed below.

Table 4-7 Commands

Command	Operation code (hex)	Description
RESERVE UNIT	16	Declares the exclusive use of a logical unit
RELEASE UNIT	17	Cancels the declaration of the exclusive use of a logical unit
INQUIRY	12	Examines the information regarding the target and logical unit
REQUEST SENSE	03	Requests a target for sense data
SEND DIAGNOSTIC	ID	Requests a target for self-check
TEST UNIT READY	00	Checks whether or not a logical unit is ready
SET WINDOW	24	Sets a window
OBJECT POSITION	31	Controls the automatic document feeder
READ	28	Requests transfer of image data
SCAN	1B	Requests the target to begin a scan operation

4.4.1 RESERVE UNIT command

The following table shows the normal sequence of the RESERVE UNIT command when used with this scanner.

Table 4-8 RESERVE UNIT command

Step	Bus phase	Initiator operation	←→	Target operation
1	BUS FREE	Verifies bus free		
2	ARBITRATION	Obtains bus-usage right		
3	SELECTION	Selects target	→	
				Drives BSY signal
4	MESSAGE OUT	Selects logical unit	→	
5	COMMAND	Specifies RESERVE UNIT (CDB)	→	
6	STATUS			Reports GOOD status
7	MESSAGE IN		←	Reports message (Command complete)
				Releases ESY signal
8	BUS FREE			

4.4.1.1 RESERVE UNIT command: COMMAND phase (initiator → target)

Where a logical unit can be accessed by two or more initiators, there could be interferences with command sequences, data, etc. This situation can be avoided by issuing the RESERVE UNIT command before initiating series of operations.

Once a logical unit has properly accepted the RESERVE UNIT command, it will be occupied by the initiator that issued the RESERVE UNIT command. If the 3rd party reservation option is supported, the logical unit might be occupied by another SCSI unit - one having an initiator function - which is specified TPID. In this condition called "reserved;' the logical unit cannot be accessed from any other initiators. The reserved condition remains effective until one of the following events take place:

1. The reservation is replaced by a new RESERVE COMMAND from the same initiator that has reserved the logical unit. (issuing another RESERVE UNIT command with the reservation still effective does not result in an error. The previously established reservation is released as a result of 2,3, or 4 described below.)

2. The RELEASE UNIT command is issued from the same initiator that has reserved the logical unit.
3. The BUS DEVICE RESET message is sent from any initiator.
4. A hardware reset condition is detected.

   The condition in effect after 3 or 4 is indicated by a sense key X'6' (UNIT ATTENTION), which is returned in response to a subsequent command.

   When a logical unit is already reserved by another initiator, if a command other than RELEASE UNIT, INQUIRY, or REQUEST SENSE is issued, the target returns the following status:

   Status: B'01100' (RESERVATION CONFLICT)
   The initiator having reserved a logical unit can change the reservation by issuing the RESERVE UNIT command to the same logical unit.

   The command descriptor block (CDB) of this command is shown in the following illustration.

	7	6	5	4	3	2	1	0
Byte 0	Operation code X'16'							
1	Logical unit number			TP	TPID			(Reserved)
2	(Reserved)							
3								
4								
5	Control byte							

(a) TP (third party): Byte 1

If the 3rd party reservation option is not supported, setting this bit to 1 causes the target to return the
following error:

- Status key: B'00001 '(CIIECK CONDITION)
- Sense key: *X'5'* (ILLEGAL REQUEST)

This scanner does not support the 3rd party reservation option.

(b) TPID (third party device ID): Byte 1

This scanner ignores TPID.

4.4.2 RELEASE UNIT command

The following table shows the normal sequence of the RESERVE UNIT command when used with this scanner.

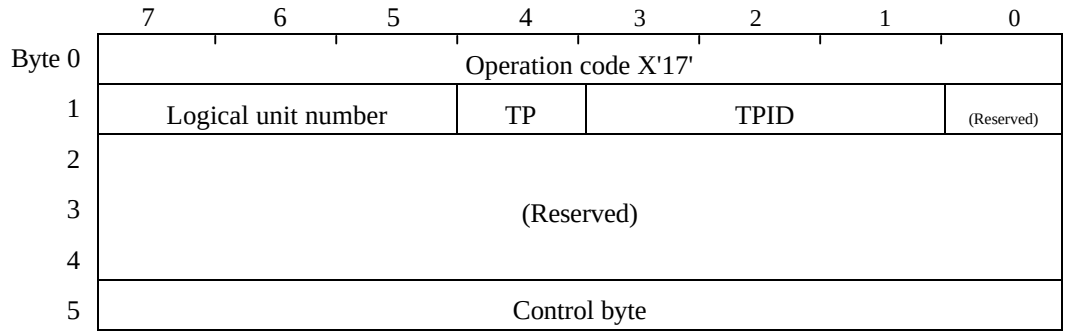
Table 4-9 RELEASE UNIT command

Step	Bus phase	Initiator operation	←→	Target operation
1	BUS FREE	Verifies bus free		
2	ARBITRATION	Obtains bus-usage right		
3	SELECTION	Selects target	→	
				Drives BSY signal
4	MESSAGE OUT	Selects local unit	→	
5	COMMAND	Specifies RELEASE UNIT (CDB)	→	
6	STATUS		←	Reports GOOD status
7	MESSAGE IN		←	Reports message (Command Complete)
				Releases BSY signal
8	BUSFREE			

4.4.2.1 RELEASE UNIT command: COMMAND phase (initiator → target)

The RELEASE UNIT command releases a reserved status. If this command comes from an initiator that has not declared reservation, the target ignores the command and responds with the GOOD status (the reserved status is not released).

The CDB of this command is shown in the following illustration.



(a) TP (third party): Byte 1

If the 3rd party reservation option is not supported, setting this bit to 1 causes the target to return the following error;

- Status key: B'0000I'(CHECKCONDITION)
- Sense key: X~5'(ILLEGAL REQUEST)

This scanner does not support the 3rd party reservation option.

(b) TPID (third party device ID): Byte 1 This scanner ignores TPID.

4.4.3 INQUIRY command

The following table shows the normal sequence of the INQUIRY command when used with this scanner.

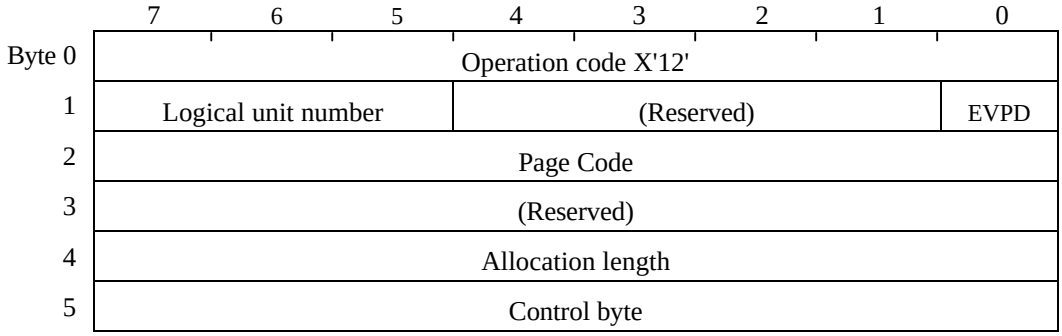
Table 4-10 INQUIRY command

Step	Bus phase	Initiator operation	←→	Target operation
1	BUS FREE	Verifies bus free		
2	ARBITRATION ON	Obtains bus-usage right		
3	SELECTION	Selects target	→	
				Drives BSY signal
4	MESSAGE OUT	Selects logical unit	→	
5	COMMAND	Specifies INQUIRY (CBD)	→	
6	DATA IN		←	Reports inquiry data
7	STATUS		←	Reports GOOD status
8	MESSAGE IN		←	Reports message (Command Complete
				Releases BSY signal
9	BUS FREE			

4.4.3.1 INQUIRY command: COMMAND phase (initiator → target)

The INQUIRY command checks information regarding a target and logical unit.

The CDB of this command is shown in the following illustration.



(a) EVPD (enable vital product data): Byte 1

This scanner does not support EVPD. If this bit is set to 1, the scanner returns the following error:

- Status key: B'OOOO1 '(CHECK CONDITION)
- Sense key: X'5'(ILLEGAL REQUEST)

(b) Page code: Byte 2

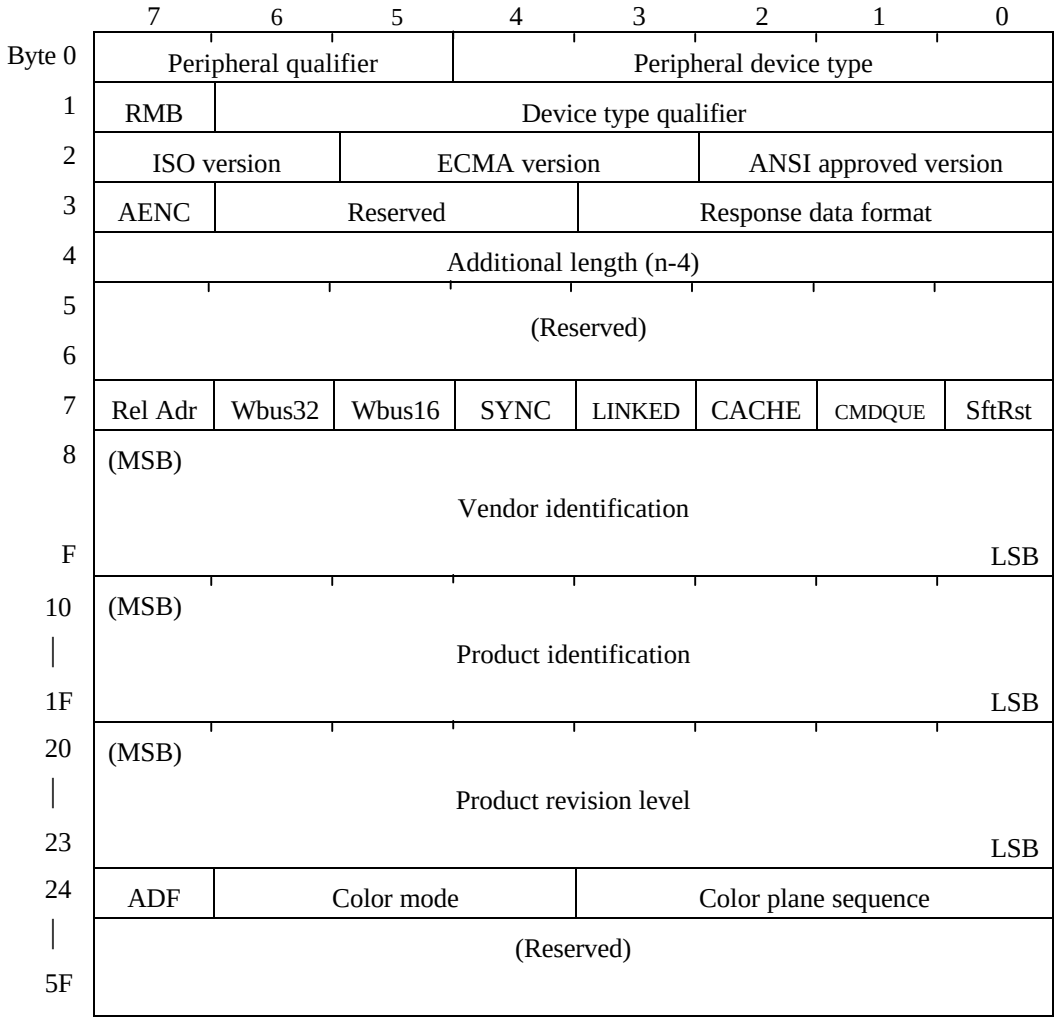
This scanner does not support page code. If this bit is set to 1, the scanner returns the following error:

- Status key: B'00001'(CHECK CONDITION)
- Sense key: x'5'(ILLEGAL REQUEST)

(C)Allocation length: Byte 4

This field specifies the storage area in bytes that the initiator allocates for inquiry data. If a 0 is set here, inquiry data is not transferred, but this is not regarded as an error. The target terminates the DATA IN phase when it has transferred either the bytes of inquiry data specified in this field or all of effective inquiry data.

4.4.3.2 Inquiry data: DATA IN phase (target → initiator)



(a) Peripheral qualifier: Byte 0
Indicates the connection status of the devices under control of the target This scanner returns B' 000'.

(b) Peripheral device type: Byte 0
Indicates the type of the devices under control of the target. This scanner returns B'00110' (scanner).

(c) Removable medium (RMB): Byte 1
This scanner does not support RMB. This scanner returns B'0'.

(d) Device type qualifier: Byte 1
This scanner does not support this field. This scanner always returns B'0000000'.

(e) ISO version, ECMA version, ANSI approved version: Byte 2

Indicates the version number of the governing standard. This scanner returns X'02' (SCSI-2).

(f) Asynchronous event notification capability (AENC): Byte 3

This scanner does not support this field, so it returns B'0'.

(g) Response data format: Byte 3

Indicates the standard, and its version number, that governs the format of inquiry data. This scanner returns B'0010' (SCSI-2).

(h) Additional length (n-4): Byte 4

Specifies the number of bytes, from byte 5 to the last byte. This value will not change with the allocation length value specified in CDB. This scanner returns ~5B' (the 91 bytes from byte 5 to byte SF).

(i) RelAdr, Wbu~2, Wbusl6: Byte 7

This scanner does not support ReIAdrIwbus32(Wbusl6. This scanner returns B' 000'.

(j) SYNC (synchronous transfer): Byte 7

This scanner returns B'0' ("synchronous transfer not supported").

(k) Linked, cache, CMDQUE: Byte 7

This scanner does not support linked/cache/CMDQUE. This scanner returns B'000'.

(l) sftRst (Soft Reset): Byte 7

This scanner performs Hardware Reset. This scanner returns B'0'.

(m) Vendor identification: Bytes 8 to F

Indicates the vendor of the logical unit in ASCII code. The vendor name is left-justified, with the blank filled with spaces (x'20'). This scanner returns "FCPA".

(n) Product identification: Bytes 10 to 1F

Indicates the product name in ASCII code. The name is left-justified, with the blank filled with spaces (X'20'). This scanner returns one of the following names:

Scan Partner 10

(o) Product revision level: Bytes 20 to 23

Indicates the version number of the product in ASCII code. This number is left-justified, with the blank filled with spaces (X'20').

(p) ADF mode: Byte 24, bit 7

0: No built-in ADF module
1: With built-in ADF module

(q) Color mode: Byte 24, bit 6 to 4

000: B&W image only
001: 3-pass color scan mode
101: 1-pass color scan mode

(r) Color plane sequence: Byte 24, bit 3 to 0

0000: RGB

4.4.4 REQUEST SENSE command

The following table shows the normal sequence of the REQUEST SENSE command when used with this scanner.

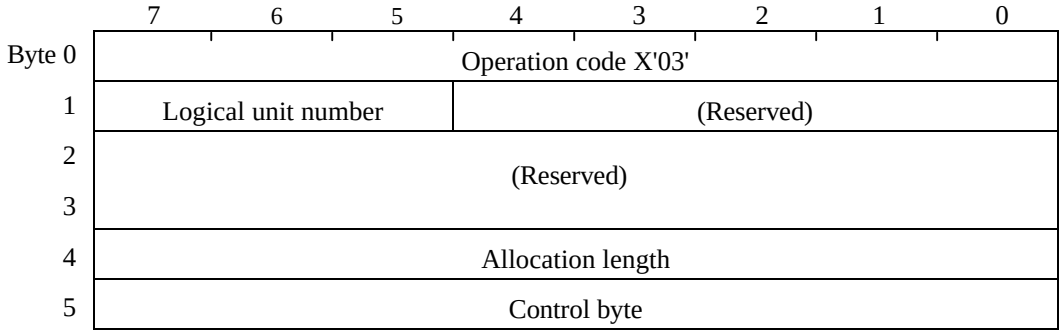
Table 4-11 REQUEST SENSE command

Step	Bus phase	Initiator operation	←→	Target operation
1	BUS FREE	Verifies bus free		
2	ARBITRATION	Obtains bus-usage right		
3	SELECTION	Selects target	→	
				Drives BSY signal
4	MESSAGE OUT	Selects logical unit	→	
5	COMMAND	Specifies REQUEST	→	
		SENSE (CDB)		
6	DATA IN		←	Reports sense data
7	STATUS		←	Reports GOOD status
8	MESSAGE IN		←	Reports message (Command Complete)
				Releases BSY signal
9	BUS FREE			

4.4.4.1 REQUEST SENSE command: COMMAND phase (initiator → target)

The REQUEST SENSE command requests the sense data that shows the status of a logical unit. On receiving this command, the target sets the unit's status in the sense data and returns it to the initiator.

The CDB of this command is shown in the following illustration.

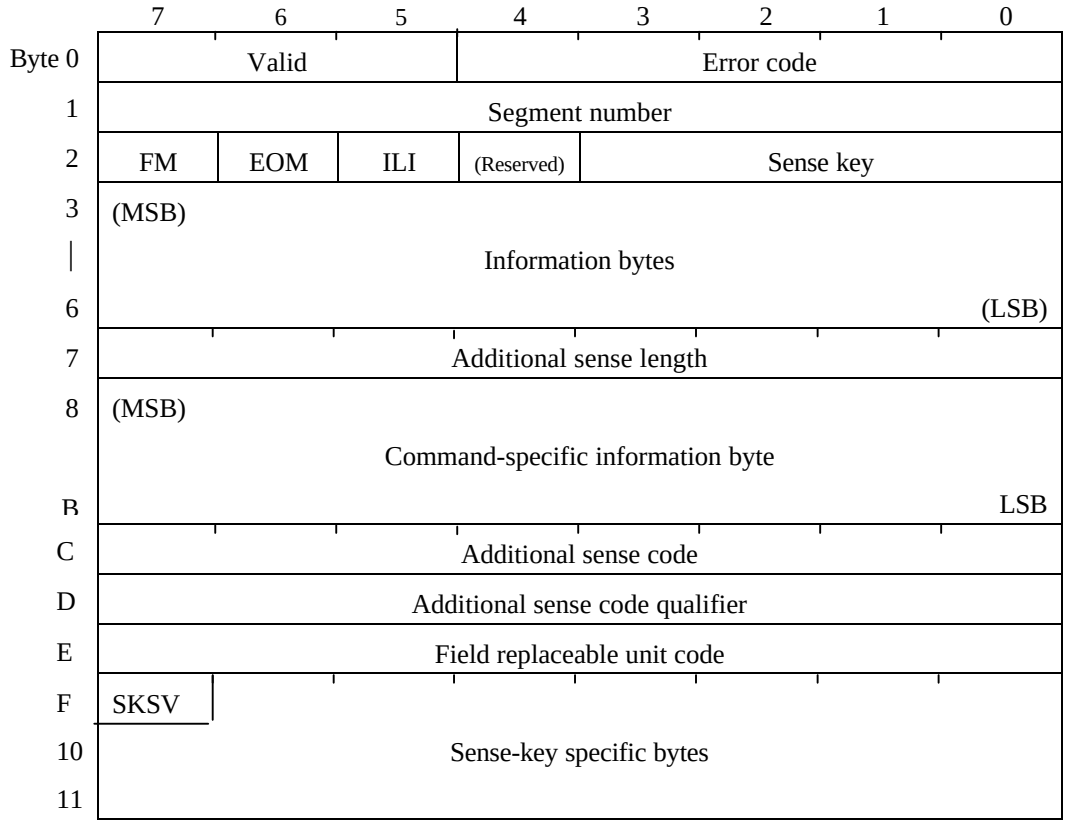


(a) Allocation length: Byte 4
Specifies the storage area in bytes that tile initiator allocates for sense data If a 0 is set here, sense data is not transferred, but this is not treated as an error. The target terminates tile DATA IN phase when it has transferred either the bytes of sense data specified in this field or all of effective sense data.

4.4.4.2 Sense data: DATA EN phase (target → initiator)

The target creates sense data if its status is B'00001 ' (CHECK CONDITION) or if a BUS FREE error has occurred. This scanner creates sense data when any of tile errors described later is encountered.

The sense data on this scanner is shown in tile following illustration.



(a) Valid: Byte 0
Indicates whether or not the INFORMATION BYTES field is as specified by ANSI. This scanner returns B'1' ("specified by ANSI").

(b) Error code: Byte 0
Differentiates between current error or deferred error. This scanner returns X'70' ("CURRENT ERROR").

(c) Segment number: Byte 1
This scanner does not support SEGMENT NUMBER. This scanner returns X'00'.

(d) FM (file mark): Byte 2

This scanner does not support FM. This scanner returns B'0'.

(e) EOM (end of medium): Byte 2

Indicates the completion of window reading: 1 when completed, 0 when not completed.

(f) ILI (incorrect length indicator): Byte 2

Indicates that an error in logical block length has been detected.

(g) Sense key: Byte 2

Indicates the logical unit status using a sense key. This scanner supports the sense keys shown in the following table:

Table 4-12

Sense key	status of logical unit
0	NO SENSE The *logical* unit has no information to be specifically described in a sense key. This status occurs because either a command has succeeded, or because a command has terminated in the CHECK CONDITION status since tile ILI bit has been set to 1.
2	NOT READY The specified logical unit cannot be accessed.
3	MEDIUM ERROR A command has terminated because of a trouble with tile medium. Typical causes of this error with this scanner are that tile ADF paper chute is empty, paper is jammed in the ADF, or the ADF cover has been opened.
4	HARDWARE ERROR An unrecoverable error was detected
5	ILLEGAL REQUEST An illegal parameter exists either in a command (CDB), or in a group of parameters sent in the DATA OUT phase following a command.
6	UNIT ATTENTION The target has been reset.
B	ABORTED COMMAND The target has aborted a command.

(h) Information bytes: Bytes 3 to 6

The information in this field is effective if ILI is 1. This scanner returns the remainder (2's complement any negative value) so tile requested transfer amount subtracted by tile actual transfer amount

(i) Additional sense length: Byte 7

Specifies the number of sense bytes that follows. Even if all additional sense bytes cannot be transferred because the allocation length in CDB is small, the value in this field is not adjusted to indicate the remaining data. This scanner always assumes ~0A'.

(j) Command-specific information bytes: Bytes 8 to B
On this scanner, this field is not supported and is fixed to X'00000000'.

(k) Additional sense code, additional sense code qualifier: Bytes C and D
A combination of these fields specifies detailed information about the error reported in the sense key. This scanner reports the following information:

Table 4-13

Sense key	Additional sense code	Additional sense code qualifier	Description
0	O0	00	No-sense
2	O0	00	Not ready
3	80	0l	Jam
3	80	02	ADF cover open
3	80	03	Document chute empty of paper
4	44	00	Abnormal internal target
4	47	00	SCSI parity error
5	20	00	Invalid command
5	24	00	Invalid field in CDB
5	25	00	Unsupported logical unit
5	26	00	Invalid field in parameter list
6	00	00	UNIT ATTENTION
B	43	00	Message error

(l) Sense-key specific bytes: Bytes F to 11
This field is reserved on this scanner.
(X'00000000' must not be expected.)

4.4.5 SEND DIAGNOSTIC command

The following table shows the normal sequence of the SEND DIAGNOSTIC command when used with this scanner.

Table 4-14 SEND DIAGNOSTIC command

Step	Bus phase	Initiator operation	←→	Target operation
1	BUS FREE	Verifies bus free		
2	ARBITRATION ON	Obtains bus-usage right		

Table 4.14 SEND DIAGNOSTIC command

Step	Bus phase	Initiator operation	←→	Target operation
3	SELECTION	Selects target	→	
				Drives BSY signal
4	MESSAGE OUT	Selects logical unit	→	
5	COMMAND	Specifies SEND DIAGNOSTIC (CDB)	→	Performs self-test
6	STATUS		←	Reports GOOD status
7	MESSAGE IN		←	Reports message (Command Complete)
				Releases BSY signal
8	BUSFREE			

4.4.5.1 SEND DIAGNOSTIC command: COMMAND phase (initiator → target)

The SEND DIAGNO~C command is used by an initiator to request a target or local unit for self-test. Two types of self-diagnostic are: (a) the selftest performed by the unit itself, and (b) the test conducted according to the instruction data from the initiator.

This scanner supports the self-test only.

The results of self-test are reported using the status and sense da~

The CDB of this command is shown in the following illustration.

	7	6	5	4	3	2	1	0
Byte 0	Operation code X'1D'							
1	Logical unit number			PF	(Reserved)	SLFTST	DO	UO
2	Reserved							
3	(MSB) Parameter list length							
4	(LSB)							
5	Control byte							

(a) PF (page format): Byte 1
This scanner ignores PF.

(b) SLFTST (selftest): Byte 1
Specifies the self-test done by the unit itself. This value is 1 on this scanner.

(C) DO (device offline), UO (unit offline): Byte 1
This scanner ignores DO and UO.

(d) Parameter list length: Bytes 3 to 4
This scanner does not support parameter list length.

4.4.5.2 Contents of self-test

The contents of self-test shall be an equivalent of NOP, provided that CHECK CONDITION is reported if err information is withheld in the unit.

4.4.5.3 Results of self-test

This scanner reports the results of self-test as follows:

(a) Normal
The GOOD status is returned.
- Status: B'00000' (GOOD)
- Sense key: X'O' (NO SENSE).

(b) Abnormal
If error information is being withheld, the following status is returned:
- Status: B'00001' (CHECK CONDITION)
- Sense key: Error information being withheld

4.4.6 TEST UNIT READY command

The following table shows the normal sequence of the TEST UNIT READY command when used with this scanner.

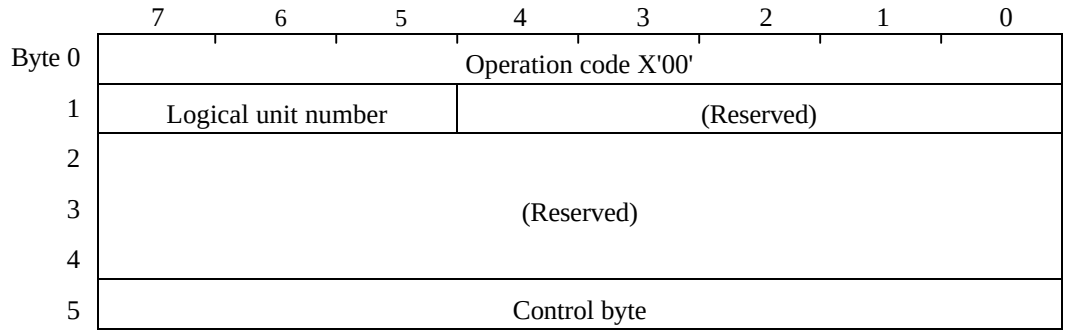
Table 4-15

Step	Bus phase	Initiator operation	←→	Target operation
1	BUSFREE	Verifies bus free		
2	ARBITRATION	Obtains bus-usage right		
3	SELECTION	Select target	→	
				Drives BSY signal
4	MESSAGE OUT	Selects logical unit	→	
5	COMMAND	Specifies TEST UNIT READY (CDB)	→	
6	STATUS			Reports GOOD status
7	MESSAGE IN		←	Reports message (Command Complete)
				Releases BSY signal
8	BUS FREE			

4.4.6.1 TEST UNIT READY command: COMMAND phase (initiator → target)

The TEST UNIT READY command checks whether a logical unit is ready. The command does not request. The acknowledgment of this command reported using the status and sense data.

The CDB of this command is shown in the following illustration.



4.4.6.2 Acknowledgment

This scanner reports the acknowledgment of the TEST UNIT READY command as follows:

(a) When ready:
- Status: B'00000' (GOOD)
- Sense key: X'0' (NO SENSE)

(0) When not ready:
- Status: B'0000l' (CHECK CONDITION)
- Sense key: X'2' (NOT READY)

4.4.7 SET WINDOW command

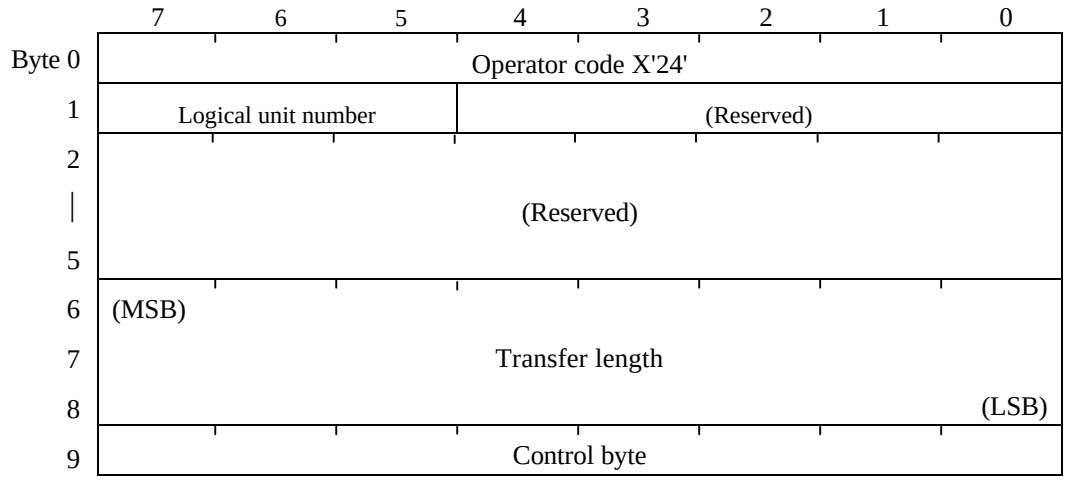
The following table shows the normal sequence of the SET WINDOW command when used with this scanner.

Table 4-16 SET WINDOW command

Step	Bus phase	Initiator operation	←→	Target operation
1	BUS FREE	Verifies bus free		
2	ARBITRATION	Obtains bus-usage right		
3	SELECTION	Selects target	→	
				Drives BSY signal
4	(MESSAGE OUT)	Selects logical unit	→	
5	COMMAND	Specifies SET WINDOW (CDB)	→	Sets window
6	DATA OUT	Specifies window data	←	
7	STATUS		←	Reports GOOD status
8	MESSAGE IN		←	Reports message (Command Complete)
				Release BSY signal
9	BUS FREE			

4.4.7.1 SET WINDOW command: COMMAND phase (initiator → target)

The SET WINDOW command is used to set a window.
The CDB of this command is shown in the following illustration.



(a) TRANSFER LENGTH: Bytes 6 to 8

Specifies the number of window data bytes sent in the DATA OUT phase. A 0 means that no data transferred; this situation is not considered an error.
If the number of bytes is not enough (less than 48) to set a single window, the scanner returns the following error

Status: B'00001' (CHECK CONDITION) Sense key: *X'5'* (ILLEGAL REQUEST)

Sense key: X'5' (ILLEGAL REQUEST)

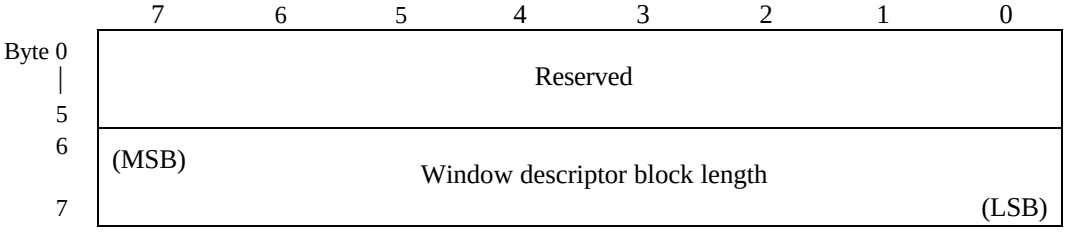
4.4.7.2 Window date: DATA OUT phase (initiator → target)

Window data specifies the details of a window. Window data contains a bead and one or more window descriptor block. Each window descriptor block specifies the attributes of a window (size, position, sca etc.).

If a target receives the SET WINDOW command when it already has window data, ..the target discards a current window data and validates the newly received data.

(a) Header

Window data (header) is shown in the following illustration.



Window descriptor block length: Bytes 6 and 7

Specifies the length in bytes of a window descriptor block. Each block has the same length. The allowable range of length is between 40 and 248 bytes. For a length outside this range, this scanner returns the following error:
Status: B'00001' (CHECK CONDITION)
Sense key: X'5' (ILLEGAL REQUEST)

(b) Window descriptor block

Window parameter data (window descriptor block) is shown in the following illustration.

	7	6	5	4	3	2	1	0
Byte 0	Window identifier							
1	(Reserved)							
2	(MSB)			X resolution				
3								(LSB)
4	(MSB)			Y resolution				
5								(LSB)
6	(MSB)			Upper Left X				
⎮								
9								(LSB)
A	(MSB)			Upper Left Y				
⎮								
D								(LSB)
E	(MSB)			Width				
⎮								
11								(LSB)
12	(MSB)			Length				
⎮								
15								(LSB)
16	Brightness							
17	Threshold							
18	Contrast							
19	Image composition							
1A	Bit per pixel							
1B	(MSB)			Halftone pattern				
1C								(LSB)
1D	RIF	(Reserved)					Padding type	
1E	(MSB)			Bit ordering				
1F								(LSB)
20	Compression type							
21	Compression argument							
22	(Reserved)							
⎮								
27								
28	Vendor unique parameter							
⎮								
n								

(c) Window identifier: Byte 0

Specifies a unique value that identifies a window. The value may be 0 to *255.* If two or more window identifiers are specified for a single set of window data, the most recently specified identifier is validated This scanner allows only one window to be set Therefore, only 0 may be specified in this field. II other than 0 is specified, this scanner returns the following error:

- Status: B~0000l' (CHECK CONDITION)
- Sense key: ***X'5'*** (ILLEGAL REQUEST)

(d) Auto: Byte 1

This scanner does not support auto. If a value other than 0 is specified, this scanner returns the foIl error:

- Status: B'0000l' (CHECK CONDITION)
- Sense key: ***X'5'*** (ILLEGAL REQUEST)

(e) X, Y resolution (XR, YR): Bytes 2 to 3 and 4 to 5

Specified here are the resolutions in the horizontal (X) and vertical (Y) scanning directions, in pixels per

inch. If 0 is specified, the default value (300 dpi) is assumed. The acceptable resolution value is as 60, 75, 80, 100, 120, 150, 200, 240, 300, 600. If a value is specified that does not comply with these conditions, this scanner returns the following error:

- Status: B'0000l' (CHECK CONDITION)
- Sense key: X'5' (ILLEGAL REQUEST)

(f) Upper left X,Y(ULX, ULY): Bytes 6 to 9, A to D

Specified here are the X and Y coordinates of the upper-left comer of the window. The coordinates expressed in units of 1/1200 inches relative to the upper-left comer of the maximum scan area. If the ULX or ULY value is outside the maximum scan area of this scanner, this scanner returns the following error:

- Status: B'00001'(CHECK CONDITION)
- Sense key: X'5' (ILLEGAL REQUEST)

(g) Width, length (W, L): Bytes E to 11, 12 to 15

Specifies here are the width and length of the window, in units of 1/1200 inches. If the W or L value outside the maximum scan area of this scanner; the following error is returned:

- Status: B'0000l' (CHECK CONDITION)
- Sense key: X'5' (ILLEGAL REQUEST)

The same error is also returned if this scanner is set to less than one raster line for vertical scanning less than two bytes for horizontal scanning.

Notes:

1. ULX, ULY, W, L versus maximum scan area:
   0< (ULX + W) ó 10200 (in 1/1200 inches)
   0< (ULY + L) ó 13937 (in 1/1200 inches) for flatbed scan
   0< (ULY + L) ó- 16800 (in 1/1200 inches) for ADF scan
2. Conditions for horizontal scanning:
   9< {XR x W/1200] ó 5100

(Values under 0 in [ ] are omitted.)

3. Conditions for vertical scanning:
   1 ó [YR x L/1200] ò- 6968 (for flat-bed scan)
   1 ó [YR x L/1200) ó 8400 (for ADF scan)
   (Values under 0 in [ ] are omitted.)

(h) Brightness: Byte 16

Specifies the brightness for half-tone monochrome output. For multibit output, this scanner ignores this field. On this scanner, brightness is variable to seven levels as shown in the following table.

Table 4-17

Value	Brightness	Remarks
00	-	Same as 80 to 9F range (with built-in dither)
00 to 1F	Brighter	
20 to 3F	↑	
40 to5F		
60 to 7F		
80 to 9F		Digitized
A0 to BF		
C0 to DF	↓	
E0 to W	Darker	

(i) Threshold: **Byte 17**

Specifies the threshold value for use in digitizing multivalued image data. A 0 value causes auto digitization. A value other than 0 indicates a relative brightness, where the darkest value is at X'FF', the brightest value is at X'01', and the normal (ordinary) value is at X'80'.

This scanner is limited to 64 levels of brightness. Internally, this scanner excludes X'00' and ignores the lowest two bits. (X'00' represents Dynamic Threshold; X'01' to X'03' are the darkest.

(j) Contrast: Byte **18**

If a value other than X'00' is specified, this scanner returns the following error:

- Status: B'0000l' (CHECK CONDITION)
- Sense key: X'5' (ILLEGAL REQUEST)

(k) IMAGE COMPOSITION: **Byte 19**

Specifies the type of image to be read. The following values are supported by this scanner:

X'00': Binary monochrome
X'0l': Dithered monochrome
X'02': Gray scale
X'03': bi-level RGB color
X'04': Dither RGB color
X'05': Multi-level RGB color

If a value X'03' or greater is specified, this scanner returns the following error:
Status: B'00001' (CHECK CONDITION)

Sense key: X'5' (ILLEGAL REQUEST)

(I) Bit per pixel: Byte 1A

Specifies the number of bits per pixel. This value shall be X'Ol', X'04' and X'08' for this scanner. For an:

value, this scanner returns the following error:

- Status: B'00001' (CHECK CONDITION)
- Sense key: X'5' (ILLEGAL REQUEST)

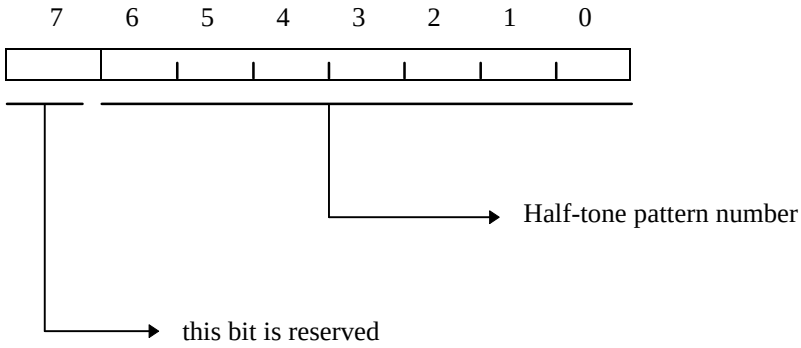
(m) Halftone pattern: Bytes lB to 1C (lB reserved)

Specifies the dithered pattern used in binarizing multibit multivalued image data. This scanner validates

this field only with the selection of dither/half-tone monochrome or mixed mode processing. For other

selections, this field is ignored. The values are specified in the following format:

- Byte IB: Reserved
- Byte IC



This scanner has four types (X'00' to X'03') of built-in pattern. If a value greater than the four range is specified, this scanner returns the following error:

- Status: B'00001' (CHECK CONDITION)
- Sense key: X'5' (ILLEGAL REQUEST)

(n) RIF (reverse image format): Byte 1D, bit 7

This scanner does not support RIF. If a value other than X'O' is specified, this scanner returns the following errors:

- Status: B'00001' (CHECK CONDITION)
- Sense key: X'5' (ILLEGAL REQUEST)

(o) Padding type: Byte 1D, bits 0 to 2

This scanner does not support Padding type. If a value other than X'000' is specified, this scanner returns

the following error:

- Status: B'0000l' (CHECK CONDITION)
- Sense key: X'5' (ILLEGAL REQUEST)

(p) Bit ordering: Bytes 1E to 1F

This scanner does not support BIT ORDERING. If a value other than X'0000' is specified, this scanner returns the following error:

- Status: B'00001' (CHECK CONDITION)
- Sense key: X'5' (ILLEGAL REQUEST)

(q) Compression type, argument: Bytes 20 to 21

This scanner does not support compression type nor compression argument If values other than X'0' are
specified, this scanner returns the following error:

- Status: B'00001' (CHECK CONDITION)
- Sense key: X'5' (ILLEGAL REQUEST)

4.4.7.3 Update of ScanPartner 600C OEM manual

ScanPartner 600C has now updated to accept paper size setting and color scanning setting. The setting parameters are specified in vender Unique Parameters of Windows Descriptor Block.

The Vender unique parameters for color image scanning is different from that of B&W image scanning. Please see table 4.19 and table 4.20. The command sequence of color image scanning is also different from B&W image scanning. See 4.7.2.1 and 4.7.2.2 for details.

4.4.7.4 B&W Scanning Vender unique parameters

Table 4-18 Vender unique parameters (byte 28 and later)

	7	6	5	4	3	2	1	0
28	Vender unique identification code							
29	Reserved							
2A	Reserved							
2B	Reserved							
2C	Reserved							
2D	Reserved							
2E	Reserved							
2F	Reserved							
30	Reserved							
31	Reserved							
32	Reserved							
33	Reserved							
34	Reserved							
35	Paper size							
36	(MSB)							
⎮	Paper width X							
39								(LSB)
3A	(MSB)							
⎮	Paper length Y							
3D								(LSB)
3E	Reserved							
3F	Reserved							

4.4.7.4.1 Vendor unique identification code: Byte 28

Specified a vendor unique identification code. For B&W image scanning, X'00' must be specified. If other value is specified, this scanner returns the following error:

Status: B'00001' (CHECK CONDITION)
Sense Key: X'05' (ILLEGAL REQUEST)

4.4.7.4.2 Paper size: byte 35

Specified a Paper Size. Set paper size used only in ADF mode.

Bit 7 : 0 Undefined
: 1 See Bit 6 to determine the paper size.

Bit 6 : 0 Standard document size (bits 3 to 0 effective)
: 1 Nonstandard document size (bytes 36 to 4D effective)

Bit 5 : Must be zero
Bit 4 : Must be zero

Bit 3 to 0: : Stand document size
0000 Undefined
0001 Undefined
0010 Undefined
0011 Undefined
0100 A4
0101 A5
0110 Undefined
0111 Letter
1000 Undefined
1001 Undefined
1010 Undefined
1011 Undefined
1100 Undefined
1101 B5
1110 Undefined
1111 Legal

4.4.7.5 Color Scanning Vender unique parameters

Table 4-19 Vendor unique parameters (byte 28 and later)

	7	6	5	4	3	2	1	0
28	Vender unique identification code							
29	Parameter length							
2A	ADF source		Color			Reserved		
2B	Highlight value							
2C	Shadow value							
2D 2E	Line width							
2F 30	Line count							
31	Reserved							
32	Reserved							

4.4.7.5.1 Vendor unique identification code: Byte 28

Specifies a vendor unique identification code. For color image scanning, X'FF' must be specified. If other value is specified, this scanner returns the following error:
Status: B'00001' (CHECK CONDITION)
Sense key: X'5' (ILLEGAL REQUEST)

4.4.7.5.2 Parameter length: Byte 29

Specifies parameter length for color scan.

4.4.7.5.3 Color scanning parameters

a) ADF: Byte 2A, Bit 7

0: Flatbed scan mode
1: ADF scan mode

b) Source: Byte 2A, Bit 6

0: The initiator could read the line width and line count of the current scan page by using "READ" command. When the bits is specified X'00', the data field of Line width (X'2D' to X'2E') and Line count (X'2F') to X'30') will be ignored by the scanner.

1: The initiator can tell the scanner the line width and the line count for the current page. The information should be placed in Line width (X'2D' to X'2E') and Line count (X'2E' to X'30').

c) Color: Byte 2A, Bit 5 to 3

Specifies a color pass.
000: Green channel
001: Red channel
010: Green channel
011: Blue channel
100: R-G-B color image

d) Highlight value: Byte 2B

Specifies the starting point for Hi-lighting. The value is in the range of X'01' to X'FF'.

e) Shadow value: Byte 2C

Specifies the starting point for shadowing. The value is in the range of X'00' to X'FE'.

f) Line width: Byte 2D to 2E

Specifies line width in bytes for the current scan page.

g) Line count: Byte 2F to 30

Specifies line count for current scan page.

4.4.8 OBJECT POSITION command

The following table shows the normal sequence of the OBJECT POSITION command when used with this scanner.

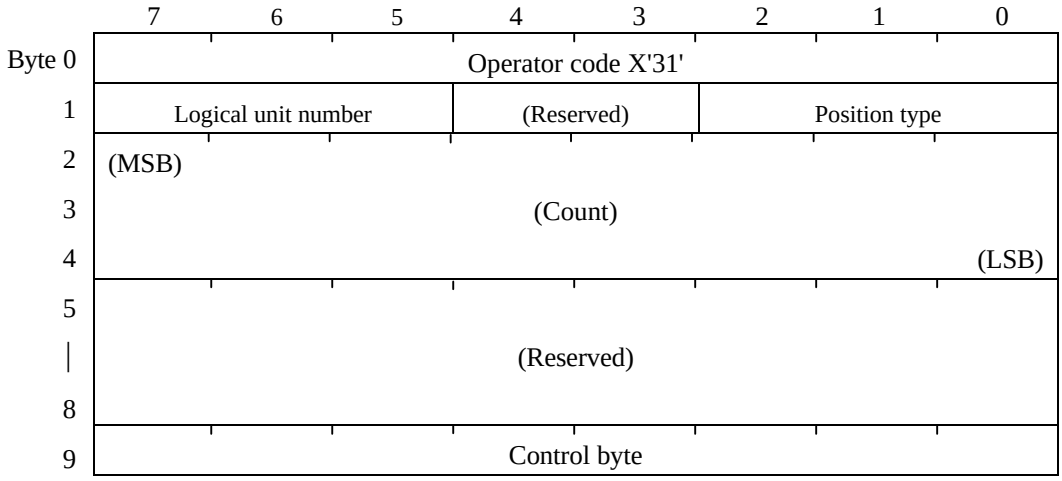
Table 4-20

Step	Bus phase	Initiator operation	←→	Target operation
I	BUS FREE	Verifies bus free		
2	ARBITRATION	Obtains bus-usage right		
3	SELECTION	Selects target	→	
				Drives BSY signal
4	MESSAGE OUT	Selects logical unit	→	
5	COMMAND	Specifies OBJECT POSITION (CDB)	→	Loads/unloads paper (ADF)
6	STATUS		←	Reports GOOD status
7	MESSAGE IN		←	Reports message (Command Complete)
				Release BSY signal
8	BUS FREE			

4.4.8.1 OBJECT POSITION command: COMMAND phase (initator → target)

The OBJECT POSITION command controls the sheets in the ADF. When the ADF is used for reading document sheets are loaded with this command before the READ command is issued.

The CDB of this command is shown in the following illustration.



(a) Position type: Byte 1

Specifies positioning functions

Bit 2	Bit 1	Bit 0	POSITION TYPE
0	0	0	Unload object
0	0	1	Load object

This scanner supports the unload object and load object functions only. If an other value is specified, this scanner returns the following error.

- Status: B'00001' (CHECK CONDITION)
- Sense key: X'5' (ILLEGAL REQUEST)

(b) Unload object

This scanner unloads the documents from the ADF. If the ADF does not contain a document when this command is received, this scanner does not generate an error but returns the GOOD status.
The unload object function is not vital to the scanner. After completion of reading with the READ command, the scanner automatically unloads the documents.

(c) Load object

This scanner loads the document from the ADF paper chute. If a document is already loaded in the ADF when this command is received, this scanner does not generate an error but returns the GOOD status.

(d) Count: Bytes 2 to 4

This scanner does not support this field. If a value other than 0 is specified, this scanner returns the following error:

- Status: B'00001' (CHECK CONDITION)
- Sense key: X'5' (ILLEGAL REQUEST)

4.4.8.2 Acknowledgment

This scanner reports the acknowledgment of the OBJECT POSITION command as follows:

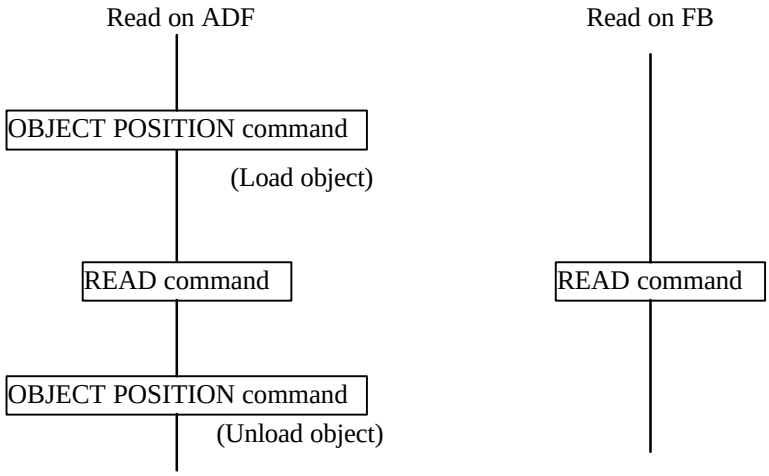
(a) Normal

The GOOD status is returned.
Status: B'00000' (GOOD)
Sense key: X'0' (NO SENSE)

(b) Abnormal

The CHECK CONDITION status is returned and sense data is created.
Status: B'00001' (CHECK CONDITION)
Send key: X'3' (MEDIUM ERROR)
(The cause of the error is jammed paper, an open ADF cover, or an empty paper supply.)

4.4.8.3 ADF sequence



Note

If the document is shorter than the window area specified by the SET WINDOW command, the deficient portion is supplemented by white data. The deficient portion is supplemented so that the data covers the entire specified window area and is transferred.

4.4.9 READ command

The following table shows the normal sequence of the READ command when used with this scanner.

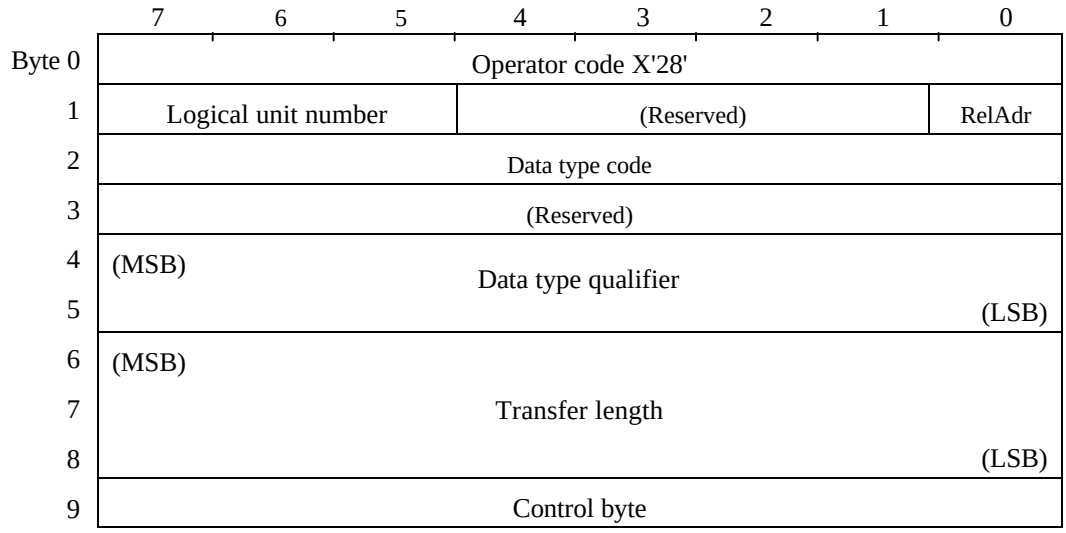
Table 4-21

Step	Bus phase	Initiator operation	←→	Target operation
1	BUS FREE	Verifies bus free		
2	ARBITRATION	Obtains bus-usage right		
3	SELECTION	Selects target	→	
				Drives BSY signal
4	MESSAGE OUT	Selects logical unit	→	
5	COMMAND	Specifies READ (CDB)	→	Reads document
6	DATA IN		←	Transfer image data
7	STATUS		←	Reports GOOD status
8	MESSAGE IN		←	Reports message (Command Complete)
				Releases BSY signal
9	BUS FREE			

4.4.9.1 READ command: COMMAND phase (initiator → target)

The READ command is used by an initiator to request a target for transfer of data. Upon receiving this command, the target returns scan data to the initiator.

The CDB of this command is shown in the following illustration.



(a) Data type code: Byte 2

Specifies the type of data to be transferred between the initiator and target. This scanner supports X'00'

(image data) only. If any other value is specified, this scanner returns the following error:

- Status: B'0000l' (CHECK CONDITION)
- Sense key: X'5' (ILLEGAL REQUEST)

(b) Data type qualifier: Bytes 4 to 5

Identifies each data of the same type. This scanner requires specifying byte 4= X'00' and byte 5 = window

identifier. If the window identifier specified in byte 5 has not been declared by the DEFINE WINDOW

PARAMETERS command, this scanner returns the following error:

- Status: B"0000l' (CHECK CONDITION)
- Sense key: X'5' (ILLEGAL REQUEST)

(c) Transfer length (TL): Bytes 6 to 8

Specifies the bytes of storage area that the initiator has allocated for the data to be transferred. If TL = 0, no data is transferred. This is not assumed an error.

The target does not transfer more data than that which is indicated by Th. This scanner requires that the transfer length not exceed 64K.

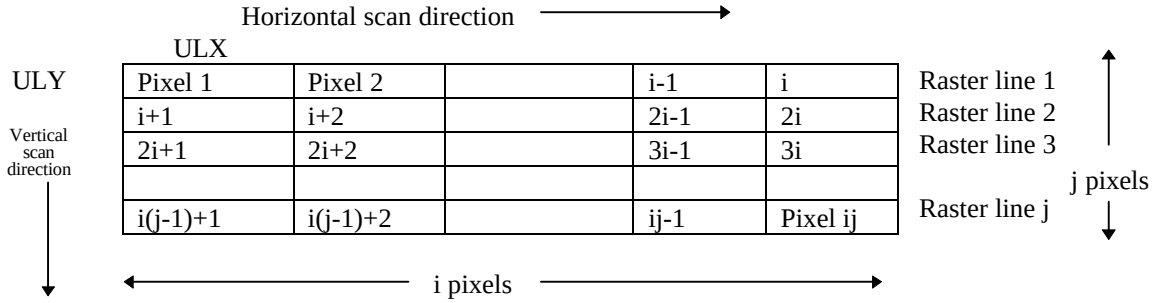
If the actual transfer amount differs from the amount indicated by TL, the target creates the following status and sense data:

- Status: B'00001' (CHECK CONDITION)
- Sense key: X'0' (NO SENSE)
- Sense data (VALID): 1
- Sense data (ILI):1 — Difference in transfer amount
- Sense data (INFORMATION): TL indicated transfer amount subtracted by actual transfer amount

Note:
For the read sequence, see items (2) and (3) in Section 4.7.

4.4.9.2 DATA IN phase (target → initiator)

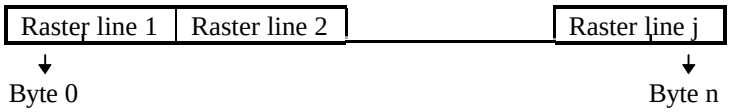
(a) Image data: (DATA TYPE CODE = x'00')

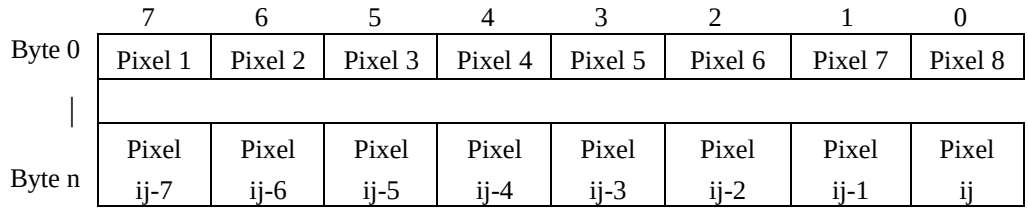


The following format is the data format that this scanner uses when transferring the image data of a window comprising i x j pixels.

(b) For binary data

1 pixel 1 bit
8 pixels 1 byte





If the data amount per raster line is not a multiple of 8 bits, the window is raised to a multiple of 8 bits.

(C) Pixel size data: (DATA TYPE CODE = X'80')

This scanner calculates the numbers of X-direction pixels and Y-direction pixels of the image data to be transferred to the initiator. The scanner performs this calculation by referencing the resolution and area up with the SET WINDOW command. This data need not be issued if the number of pixels are known 1 the initiator.

The transfer format for this data is shown in the following illustration.

Byte 0 | 3	(MSB) Number of X-direction pixels (LSB)
4 | 7	(MSB) Number of Y-direction pixels (LSB)
8 | F	(Reserved)

4.4.10 Scan command

The following table shows the normal sequence of the SCAN command when used with this scanner.

Step	**Bus phase**	**Initiator operation**	**←→**	**Target operation**
1	BUS FREE	Verifies bus-free		
2	ARBITRATION	Obtains bus-usage right		
3	SELECTION	Selects target	→	
				Drives BSY signal
4	MESSAGE OUT	Selects logical unit	→	
5	COMMAND	Specifies SCAN (CDB)	→	
6	DATA OUT		→	Transfer data
7	STATUS		←	Reports GOOD status
8	MESSAGE IN		←	Reports message (Command Complete)
				Releases BSY signal
9	BUS FREE			

4.4.10.1 SCAN Command phase (initiator → target)

The Scan Command requests the target begin a scan operation. It is required for scanning color image, but not required for scan B/W image.

	7	6	5	4	3	2	1	0
Byte 0	Operator code X'1B'							
1								
2	(Reserved)							
3								
4	Transfer length							
5	Control byte							

Transfer length: X'01'

The transfer length specifies the length in byte of the window identifier list that should be sent in the DATA OUT phase.

Window identifier: X'00'

4.5 Status: STATUS phase (target fi *initiator)*

Each time a command is terminated, the target moves into the STATUS phase and returns a status byte to the initiator to report the completion of the command.

Status byte

7	6	5	4	3	2	1	0
(Reserved)		Status byte code					(Reserved)

The status supported by this scanner are summarized in the following table.

Table 4-22

Code	Status of unit
000000	GOOD • The command has successfully terminated
000001	CHECK CONDITION a) The command has abnormally terminated. b) An abnormal condition was detected before a unit is selected. • The target detected an error before start of command-controlled processing. • A unit that switched from the NOT READY status to the READY status was selected for the first time. • A unit that received a RESE~ CONDITION or a BUS DEVICE RESET message was selected for the first time.

Table 4.22

Code	**Status of unit**
00100	BUSY A target or logical unit cannot accept a new command. • The logical unit is executing processing. • The target is executing processing on a specified logical unit or other logical unit. • The target intends to report to an other initiator the sense data of a specified logical unit. • The target intends to report to an other initiator the sense data of a logical unit that *was* not specified. • The target intends to report the status to any initiator.
01100	RESERVATION CONFLICT • The specified unit is already reserved by another initiator.

When a target is released from the BUSY status, it will not issue a notification of the release. Therefore initiator needs to check the status of units periodically and needs to issue the command again.

4.6 Messages

This section describes the detection of an ATN signal and explains the types of messages supported by this scanner.

4.6.1 ATN detection

The following table summarizes the timing at which this scanner detects and ATN signal.

Table 4-23

Phase	**ATN detection timing**
SELECTION	Immediately before a phase change
COMMAND	Immediately before a phase change
DATA OUT	Immediately before a phase change
DATA IN	Immediately before a phase change
STATUS	Immediately before a phase change
MESSAGE OUT	Upon each reception of a message
MESSAGE IN	Upon each transmission of a message

4.6.2 Message types

Messages provide information consisting of one or more bytes that are transferred in the MESSAGE IN and MESSAGE OUT phases. These messages are used to control the bus phase sequence.

The initiator creates an ATTENIION condition for the target, indicating that it has a message to be reported to the target Only then the target switches to the MESSAGE OUT phase to receive the message.

If the target has completed the SELECTION phase, it can execute the MESSAGE IN phase at any time to send the message to the initiator.

The messages that can be communicated with this scanner are listed on the following table.

Table 4-24

Code	Message
00	COMMAND COMPLETE
05	INIATIATOR DETECTED
	ERROR
06	ABORT
07	MESSAGE REIECF
08	NO OPERATION
09	MESSAGE PARITY ERROR
0C	BUS DEVICE RESET
8O TO FF	IDENTIFY

4.6.2.1 COMMAND COMPLETE (X'00'): MESSAGE IN phase (target → initiator)

This message indicates that a command has been terminated and a valid status has been reported to the initiator.

The target always reports the COMMAND COMPLETE message after the STATUS phase at the completion the input/output operation. (This requirement also applies if the COMMAND phase is not executed because command cannot be received.)

Upon receiving the COMMAND COMPLETE message, the initiator knows that a command has terminated.

After sending the COMMAND COMPLETE message, the target switches into the BUS FREE phase.

If the COMMAND COMPLETE message is rejected with the MESSAGE REJECT message, this scanner switches into the BUS FREE phase.

4.6.2.2 INITIATOR DETECTED ERROR (X'05'): MESSAGE OUT phase (initiator → target)

This message indicates that the initiator detected a retriable error and intends to request the target for retry.

The initiator does not intend to issue another message by activating ATN before it deactivates the ACK INITIATOR DETECTED ERROR message.

Table 4-25

ATN detection phase	Action
SELECTION	Moves to the BUS FREE phase
COMMAND	Discards the CDB already received and returns to the COMMAND phase
DATA OUT	Discards the data already received and returns to the DATA OUT phase
DATA IN	When transferring image data, the scanner moves to the STATUS phase (Check Condition) → MESSAGE IN phase (Command Complete) → BUS FREE phase and keeps the sense key X'B' (Aborted Command) When transferring inquiry data or sense data, returns to the DATA IN phase and transfers data again
STATUS	Returns to the STATUS phase and sends the status byte again
MESSAGE OUT	Ignores this message
MESSAGE IN	Returns to the MESSAGE IN phase and sends the message byte again

4.6.2.3 ABORT (X'06'): MESSAGE OUT phase (initiator → target)

The initiator requests the target to clear the input/output operation of the specified I/O unit (i.e., the input operation ordered by the initiator that issued this message) and to move to the BUS FREE phase. Input/output operations ordered by other initiators are not affected.

If a logical unit is not identified before the ABORT message, the target merely moves to the BUS FREE

If no operation to be cleared, an error does not occur.

The initiator does not intend to issue another message by activating ATN before it deactivates the ACK of ABORT message.

This scanner does not have a function that clears input/output operation for certain initiators. This scanner must have been reserved when it is operated in multi-initiator environment.

4.6.2.4 MESSAGE REJECT (X'07'): MESSAGE IN/OUT phase (initiator → target)

This message indicates that a transferred message was rejected by the receiver as invalid or unexecutable.

The initiator does not intend to issue another message by activating AIN before it deactivates the ACK of MESSAGE REJECT message.

Upon receiving the MESSAGE REJECT message, this scanner takes action as shown in the following table

Table 4-26

Message rejected	Action
COMMAND COMPLETE	Moves to the BUS **FREE** phase. (It is not assumed as an error.)
MESSAGE REJECT	Responds the CHECK CONDITION status
No message issued	Moves to the BUS FREE phase

4.6.2.5 NO OPERATION (X'08'): MESSAGE OUT phase (initiator → target)

This message is issued in response to a message request from the target and indicates that the initiator does have a valid message.

The initiator does not intend to issue another message by activating ATN before it deactivates the ACK of the OPERATION message.

4.6.2.6 MESSAGE PARITY ERROR (X'09'): MESSAGE OUT phase (initiator → target)

This message indicates that the initiator detected a parity error in the message received. The target resends that message.

The initiator does not intend to issue another message by activating ATN before it deactivates the ACK of the MESSAGE PARITY ERROR message.

Upon receiving the MESSAGE PARITY ERROR message, this scanner takes action as shown in the following table.

Table 4-27

Phase when ATN is detected	Action
MESSAGE IN	Moves to the MESSAGE IN phase and resends the message (*1)
Other	Moves to the BUS FREE phase

* 1 This scanner retries three times with the message in the MESSAGE IN phase. If the third retry fails, the scanner immediately moves to the BUS FREE phase.

4.6.2.7 BUS DEVICE RESET (X'0C'): MESSAGE OUT phase (initiator → target)

This message addresses any initiators that are operating, or waiting for operation, on the target. The message initializes those initiators by resetting their input/output operations.

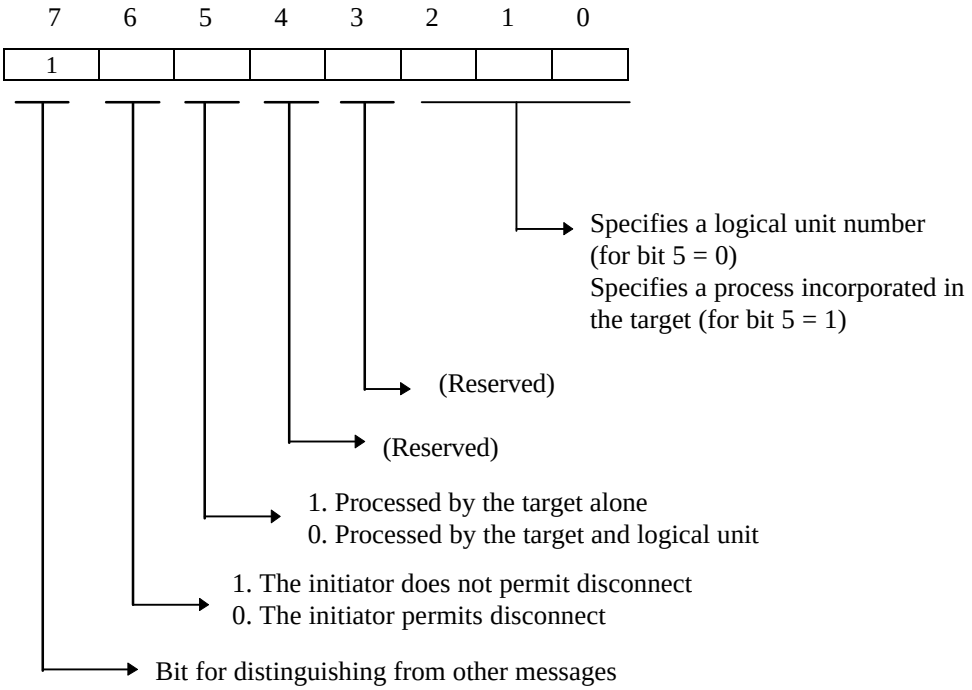
The BUS DEVICE RESET message is transferred in the asynchronous mode.

This scanner generates the UNIT ATTENTION condition to all initiators.

After being initialized, the initiators move to the BUS FREE phase.
The initiators do not intend to issue another message by activating ATN before they deactivate the ACK of the BUS DEVICE RESET message.

4.6.2.8 IDENDIFY (X'80' TO X'FF'): MESSAGE OUT phase (initiator → target)

This message specifies either a logical unit under control of the target, or a process incorporated in the target (maintenance, self-diagnostic, etc.).

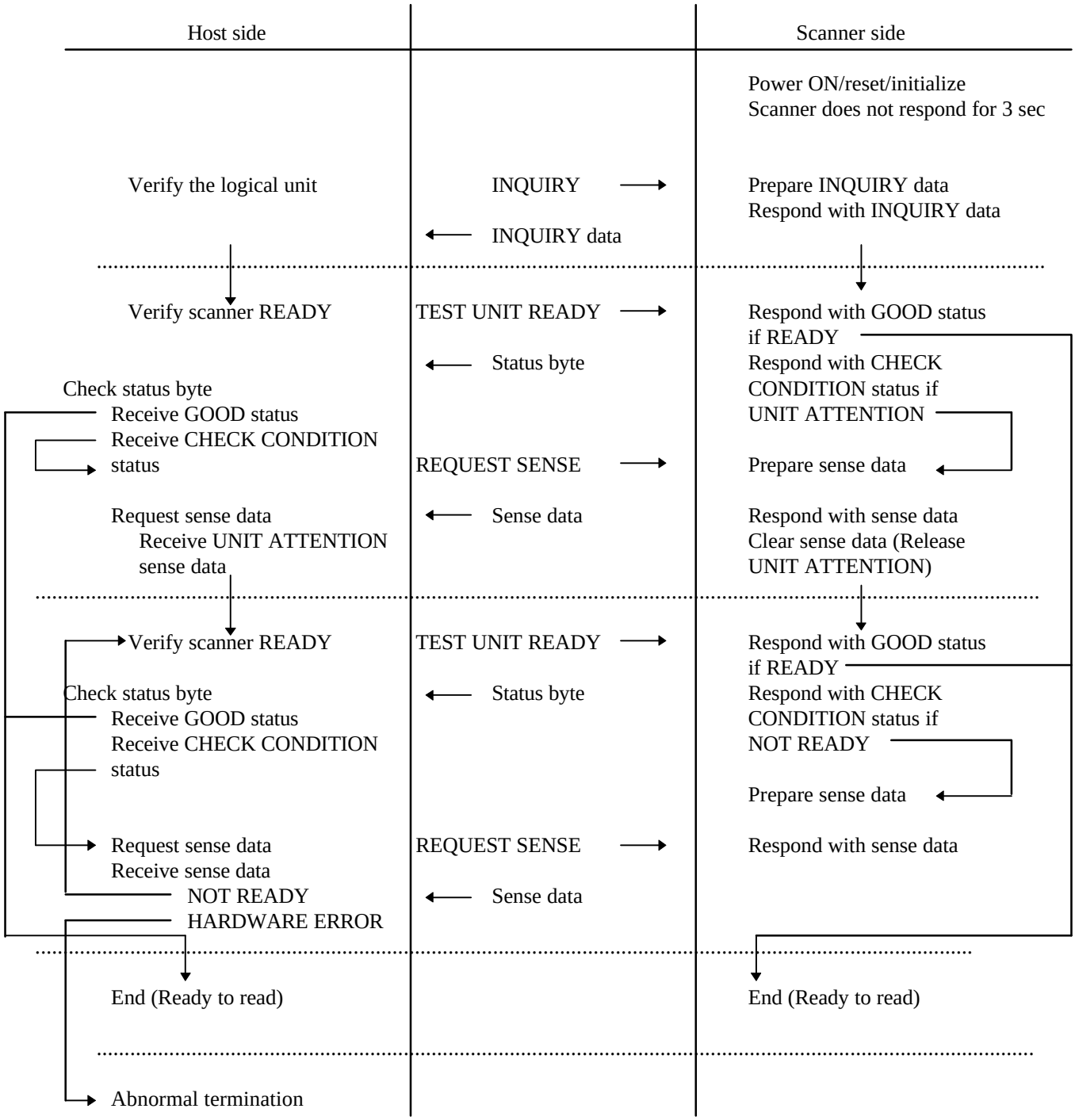


This scanner does not support the target-incorporated process function. Therefore, if a 1 is set in bit 5, the IDENTIFY message is rejected with the MESSAGE REJECT message.

4.7 Command Sequence

This section describes the initial sequence and read sequence.

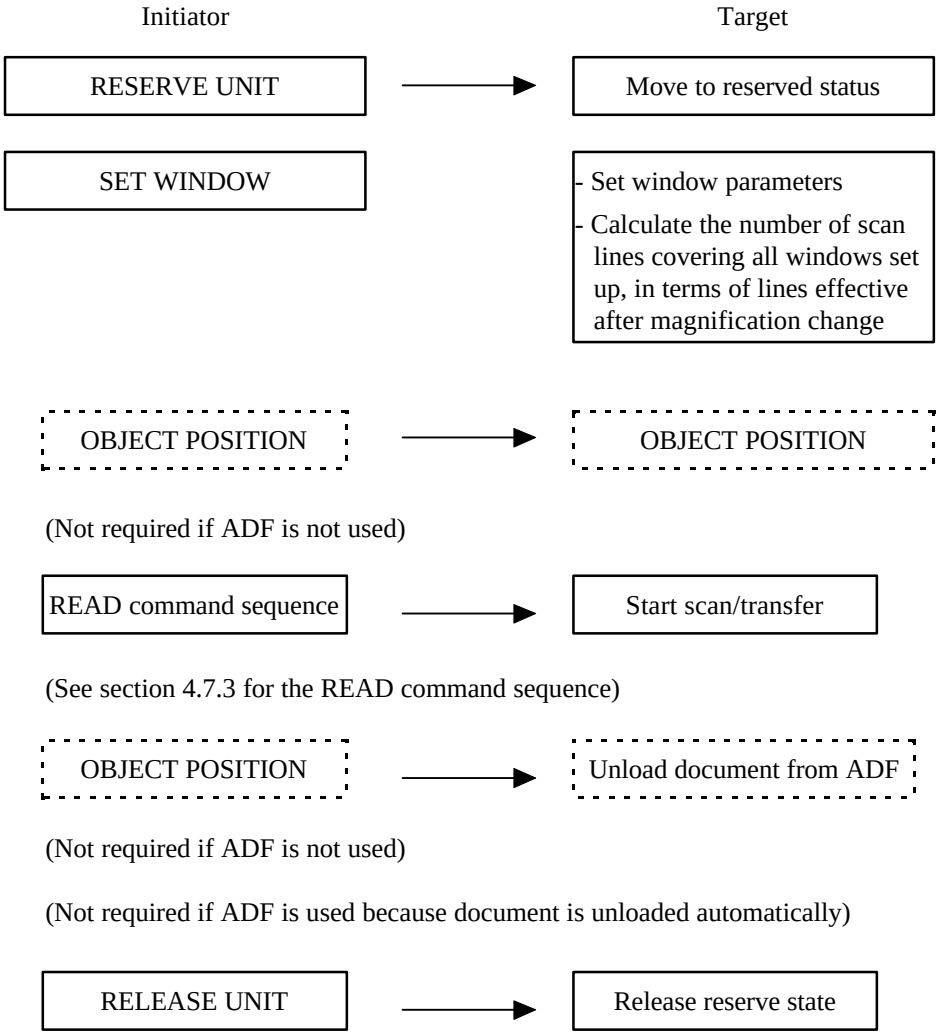
4.7.1 Initial sequence



4.7.2 Read sequence

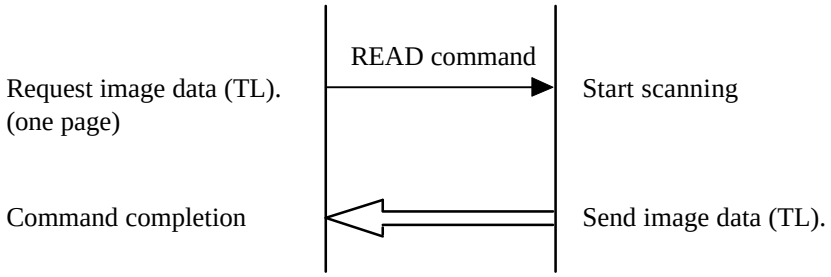
The following illustration is an example of the command sequence used with this scanner. All commands are assumed to be issued from a single initiator.

4.7.2.1 Read sequence for B&W mode

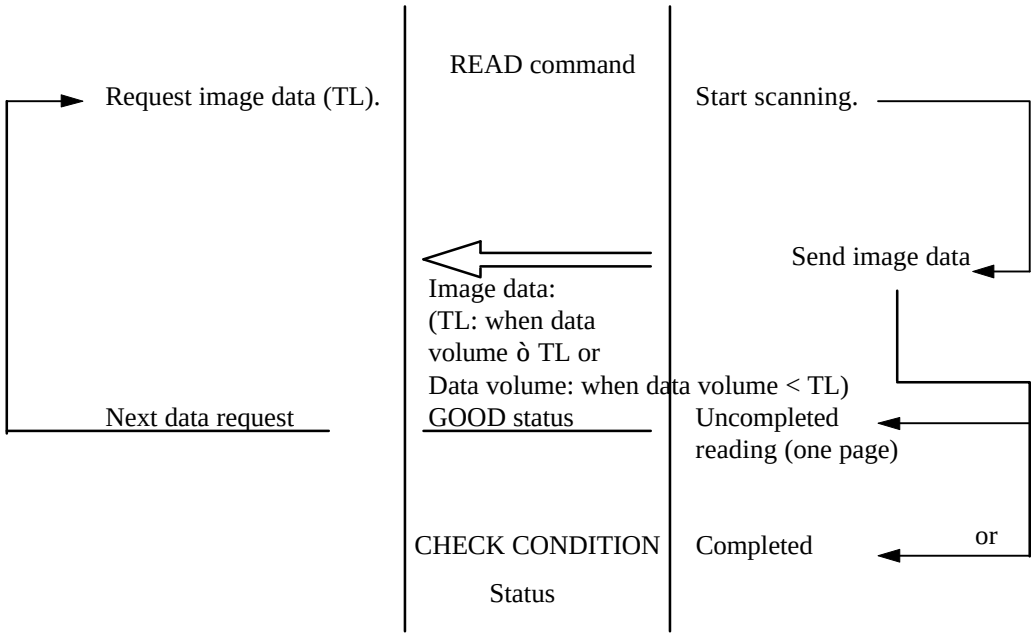


4.7.3 READ command sequence

4.7.3.1 Single READ



4.7.3.2 Multiple READ



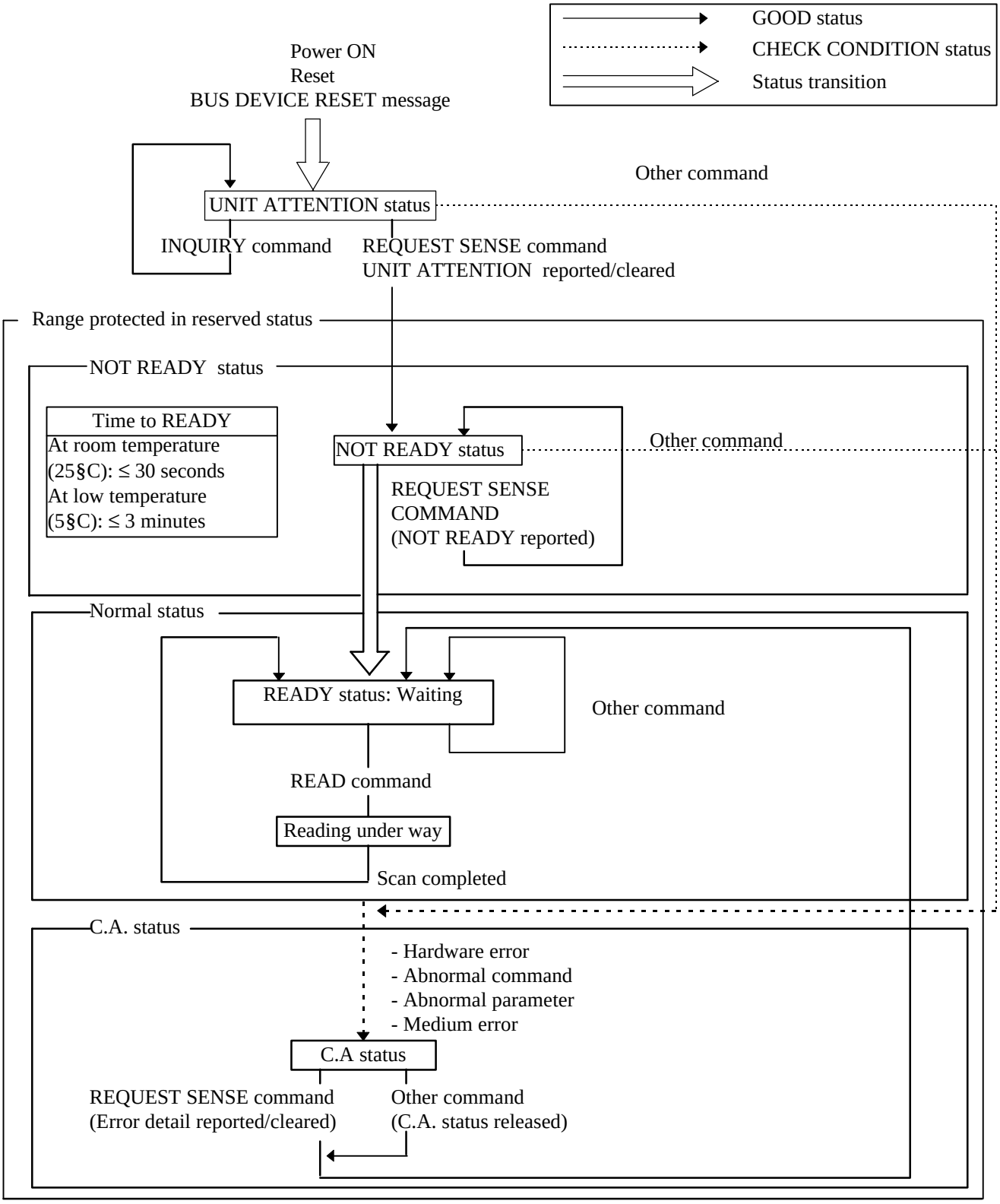
See Notes 1 and 2

Notes:

1. If the requested transfer volume is more than the actual data volume, this scanner informs the initiator that the requested transfer amount is abnormal. This is done as the scanner returns the status 00001 (CHECK CONDITION) and creates the following sense data:
   IL = 1
   INFORMATION = requested transfer amount (TL).- actual data amount
   This status is usually sent to the last READ command of the sequence. (For commands other than the last READ, the GOOD status is reported.) If the data amount requested by the last READ command agrees with the last data amount left, the GOOD status is reported to the READ command, and the CHECK CONDITION status is reported to the next READ command.

2. Once all scan data has been transferred, the CHECK CONDITION status is always reported to the READ command that follows. Before attempting another read, first issue the SET WINDOW command.

4.8 Status Transition of Logical Unit



4.9 Error Table

The following table lists errors that may occur upon issue of each command.

Table 4-28

	Sense key	**0**	**2**	**3**	**4**	**5**	**6**	**B**
	Content	NO SENSE	NOT READY	MEDIUM ERROR	HARD-WARE ERROR	UNIT AT-TENTION	ILLEGAL REQUEST	ABORTED COMMAND
SET WINDOW		○	○	—	○	○	○	—
INQUIRY		○	—	—	—	—	(*1)	—
OBJECT POSITION		○	○	○	○	○	○	—
READ		○	○	—	○	○	○	—
RELEASE UNIT		○	○	—	○	○	○	○
REQUEST SENSE		○	—	—	—	—	(*1)	—
RESERVE UNIT		○	○	—	○	—	○	—
SEND DIAGNOSTIC		○	○	—	—	○	—	—
TEST UNIT READY		○	○	(*2)	○	○	○	

*1 Error in command descriptor
*2 Jam of document being unloaded from ADF at power ON or reset time.

4.10 Items for Specifying Window

The following table lists the items available for specifying a window

Table 4-29

Image composition Item	**00 Binary monochrome**	**01 Dithered/ halftone monochrome**	**02 Multibit**
	Window	Window	Window
X, Y resolution	○	○	○
Upper left X, Y	○	○	○
Width, length	○	○	○
Threshold	○	▲	▲
Bit per pixel	01	01	08
Halftone pattern	▲	○	▲

○: Can be specified

×: Cannot be specified

▲: Ignored

5. Diagnostics

The ScanPartner 600C has diagnostics to help you determine the cause of operational problems. Some of the diagnostics function with the scanner online, while others are part of a separate offline diagnostic feature.

5.1 Online diagnostics

Determine operational problems by observing the control panel Ready and Paper Jam LEDs. With the scanner online and operating normally, the Ready LED is on and the Paper Jam LED is off. Any other LED combination indicates a problem, as shown in the following table.

Ready LED	Paper Jam LED	Error indication
Off	On	Group 3 error
Off	Blinking	ADF cover open
Blinking	Off	Power on diagnostics
On	On	Run offline diagnostics

Table 5-1 Online diagnostics

If the ADF cover is open, close it. For the group errors, see the flowcharts later in this section. When both lights are blinking, run the offline diagnostics as explained in the next section.

5.2 Offline diagnostics

To run the offline diagnostics, turn the scanner off, set the SCSI ID switch (located on the back, next to the SCSI connector) to 8, and turn the power back on. When you first turn the scanner back on, the READY light will blink, indicating that the diagnostics are in progress. Observe the front panel LEDs closely. In a short time, the LEDs indicate the results of the offline diagnostics as explained in the table below.

Ready LED	**Paper Jam LED**	**Error indication**
The two LEDs blink alternately.		RAM error
2 blinks	2 blinks	ROM error
3 blinks	3 blinks	DC offset adjust failure (too dark)
4 blinks	4 blinks	DC offset adjust failure (too bright)
5 blinks	5 blinks	Group 2 error
6 blinks	6 blinks	Group 1 error (inverter check error)

Table 5-2 Offline diagnostics results

For RAM or ROM errors, refer to Main Control PCBA Replacement in Chapter 4. For the Group 2 error, see the flowchart in the following section.

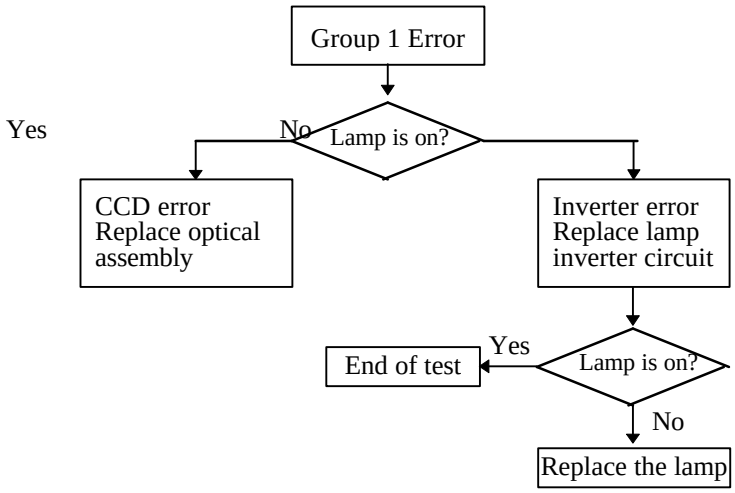
To return the scanner to online operation, turn off the scanner, reset the SCSI ID to its pretest setting, and turn the scanner back on.

5.3 Diagnostic flowcharts

Use the flowcharts that follow to determine the exact problem when either the online or offline diagnostics indicate a group error. Refer to Chapter 4 for parts replacement.

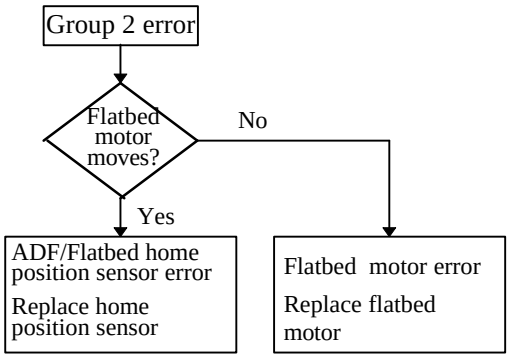
5.3.1 Group 1 error flowchart (Lamp assembly)

This flowchart applies when the Ready and the Paper Jam LED each blinks 6 times the same while, with the scanner offline.



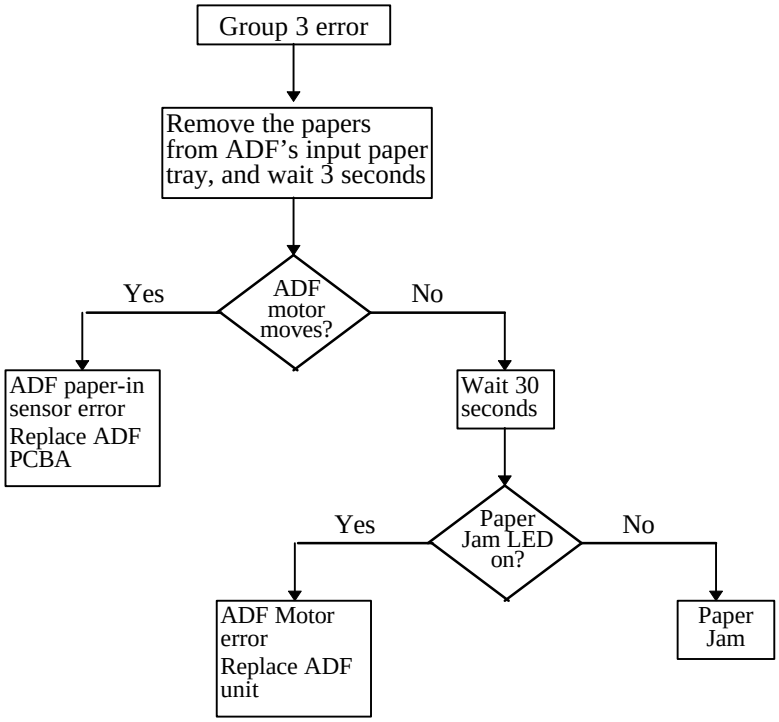
5.3.2 Group 2 error flowchart (Flatbed/ADF motor)

This flowchart applies when the offline diagnostics error indication is the simultaneous blinking 5 times of the Ready and Paper Jam LED.



5.3.3 Group 3 error flowchart (paper in ADF paper tray)

This flowchart applies when the Ready LED is off and Paper Jam LED steadily on with the scanner online, and there is paper in the ADF paper tray.



5.3.4 Group 3 error flowchart (no paper in ADF paper tray)

This flowchart applies when the Ready LED is off and Paper Jam LED steadily on with the scanner online, and there is no paper in the ADF paper tray.